

Ciba Symposia

VOLUME 9
NUMBER 1
JUNE 9
1947



JUNE-JULY
1947

THE MEDICAL SCHOOL OF VIENNA

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PUBLISHED SOLELY FOR THE INTEREST OF THE MEDICAL PROFESSION
CIBA PHARMACEUTICAL PRODUCTS, INC., LAFAYETTE PARK, SUMMIT, N. J.

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THE ORIGIN OF THE UNIVERSITY OF VIENNA AND THE RISE OF THE MEDICAL SCHOOL

ARTURO CASTIGLIONI,

THE 14th century marks an important period in the development of all the great cultural and political institutions of Europe. At the time when the formation of the first modern states occurred, the rulers of these states used every opportunity to consolidate power and position. The example of Italy and France, where the universities played a great rôle in ensuring the position and might of the princes, suggested to the chiefs of the states in central Europe to follow suit. Accordingly new universities were founded in order to give their subjects the possibility of learning and exercising the professions without turning to foreign schools. The universities of the 14th century and of later times were, however, always dependent on the authority of the Church; even when they seemed to be autonomous. It was not admitted that a university might be founded without the permission of the Pope. At the time of the ascension of Rudolph of Hapsburg to the throne, Italy no longer belonged to the immediate sphere of power of the Holy Roman Empire; consequently, it became necessary for the Emperors to have their universities in the capitals of their various dominions.

Charles IV, King of Bohemia, who became Emperor in 1355 and chose Prague as his residence, gave a great impetus to the development of the city. In 1346, Pope Clement VI granted permission for the founding of the University of Prague which was modeled after the University of Paris at which the King himself had been a student. He wanted to have a school which would rival Paris and Bologna, and, as teachers, called some of the most famous scholars. Prague became the center of learning for the Slavic countries.

Vienna was the second great university of central Europe. Its foundation is due to Duke Rudolph IV of Austria, a son of Charles IV, who had vainly tried to become Emperor, and wanted to make Vienna the economic and intellectual center of his dominion. The Hapsburgs increased their territories; Tyrol and Carinthia had been annexed to their dominions. The roads which led to Italy and the Balkans, the main traffic arteries to the East, the Alps, were in their possession.

A nucleus for a university in Vienna was a school of St. Stephen. We know that Emperor Frederick II, in 1237, had the School of St. Stephen under the authority of a "Rector of the Scholars," who was to be appointed by the Emperor and had the right to appoint other masters. At the beginning of the 14th century there was a eulogy of the school to which, it is said, clerks from all parts of the world came to hang on the masters' lips. It is therefore, that, as Rashdall observed, the School of St. Stephen was more than a mere grammar school. Rudolph IV obtained from the Pope a promise of a charter for the new university, and it was issued on the 12th of March, 1358, and contained an ample grant of privileges and fixed the constitution of the university in considerable detail. A "General Privileged Studium shall henceforth be established in Vienna, according to the ordinances and customs observed at Athens, then at Rome and afterwards at Paris." The constitution is the same as the Constitution with a few modifications. The ancient town church of St. Stephen (which was generally known as the "Stephan" church), and it seems that it was who changed the design.

men to All Saints in 1365), was to be a collegiate and its provost to become rector of the university.

A short time after the issue of Rudolph's letters, the Papal Bull of establishment was granted. However, Urban V made an important restriction, excluding theology from the faculty. Prague had been granted a theological faculty from the first, and this was probably through the intrigues of Charles IV that a similar concession was granted to Vienna.

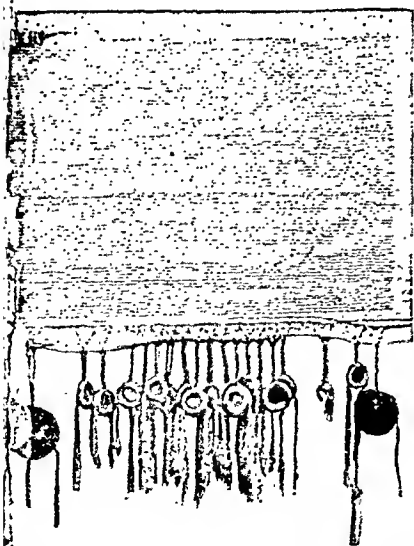
On July 27th, 1365, a short time after the privilege had been granted, Rudolph had attended in Milan the marriage of his brother with the daughter of Duke Bobo Visconti, died suddenly at the age of twenty-six. The heirs to the throne were his brothers, Albert III, sixteen years old and Leopold III, fourteen years old. This began a fierce struggle for the throne, which finally ended with the division of the possessions. In 1379, Albert III, rector in Vienna, began the institution of the university, and in a short time, the arts faculty, which was dependent on the

Cathedral of Saint Stephen, attracted a great number of students from all parts. The grammar school of St. Stephen's was also incorporated into the university which was henceforth to appoint its rector and three other masters.

The division of the students into nations was officially adopted by the constitution of 1384, and the students began to inscribe themselves in 1385. There were four nations: 1. the Austriales, that is the Austrians, among whom were included the students from Trieste and Istria; 2. the Rhenenses (including western Germany and all western Europe); 3. the Hungari (embracing students from Hungary as well as all Slavs); and 4. the Saxones (which included the students from northern and eastern Germany and Brittany). The number of the students was small in the first years. In 1386 they numbered one hundred and fifty-five, and up to 1404 this number was fairly constant, although it began to diminish during the next few years. In 1411, the number began to increase again, and it was about 380 to 450 in the next years. From the beginning up to the year 1519, that is, over a period of about two centuries, the number of the students totalled around fifty thousand.

A number of special exemptions and privileges were granted to the Viennese students. All charges against a master or scholar were to be tried, not as at Paris by the Bishop, but by the Chancellor. Criminal charges were to go before the Rector who had jurisdiction also in ordinary civil actions and minor criminal charges where the plaintiff was a scholar.

Many precedented privileges were conferred for the protection of scholars and for the benefit of the university. Property confiscated for outrages on scholars was to be divided between the university and the injured party, the assailant of a scholar lost the benefit of sanctuary, and if a scholar was robbed the Duke would compensate the loss. Finally a special quarter of the town was granted for the accom-



Seal of the University of Vienna granted by Albert III, Duke of Austria, 1384. Originally it had 27 seals (17 still extant).



The great seal of the University of Vienna dating from the year 1366.

modation of students with a right to demand such houses as they pleased for their residence, the rent to be fixed in the usual manner by arbitration. By the terms of the charter this quarter was to be fortified against aggressions by a special wall.

Some teachers were called from Paris and from Prague. The Duke founded colleges and scholarships; he granted exemption of taxes to all the members of the university, chose the seat of the schools, and put the university under the direction of the Archbishop of Salzburg, and the Dean of the chapter of Vienna, who represented the Pope. A Pontifical Bull (1384) confirmed all the privileges and gave permission to establish a faculty of theology. In the 15th century the poet Michael Beheim extolled the University of Vienna, as "the beautiful and venerated tree flourishing in the garden of the noble city." The

Duke's advisor in all matters concerning the university was Heinrich von Langenstein, who had taught in Paris. The organization of the school followed the example of Paris but soon a very important change was made. Up to the end of the 14th century any professor could teach any subject, because the only important guide in teaching was the text which the lecturer had to read to the students; and the different texts were divided between the professors by drawing lots. At the beginning of the 15th century, the council of the Faculty assigned the subjects to the different teachers according to their respective choice.

In the first fifteen years of existence of the university, no more than ten or twelve students of medicine were enrolled and only three obtained the medical degree in Vienna. Many of the students had attended Italian schools. Some were Italians,

as for instance, Corrado di Osimo and Enrico Voldoni, who came from Milan, and Johannes Silber who came in 1398 from Pavia. The first teacher in anatomy was Galeazzo di Santa Sofia, a member of a very famous family of doctors, who came from Padua. It was at this time that the Duke ordered that none of the teachers or students be permitted to leave the university to enroll in another school on pain of severe punishment. The same rule had been enacted in all Italian universities.

Three doctors, Johannes Gallici, likely of Italian origin, Hermann Lurz and Konrad von Schifferstadt, were appointed as Masters of the Medical Faculty, and prepared the statutes, including all the regulations for the program of studies and examinations. The statutes had to be discussed every year in a meeting of all the members of the faculty, to whom they were read in a solemn ceremony.

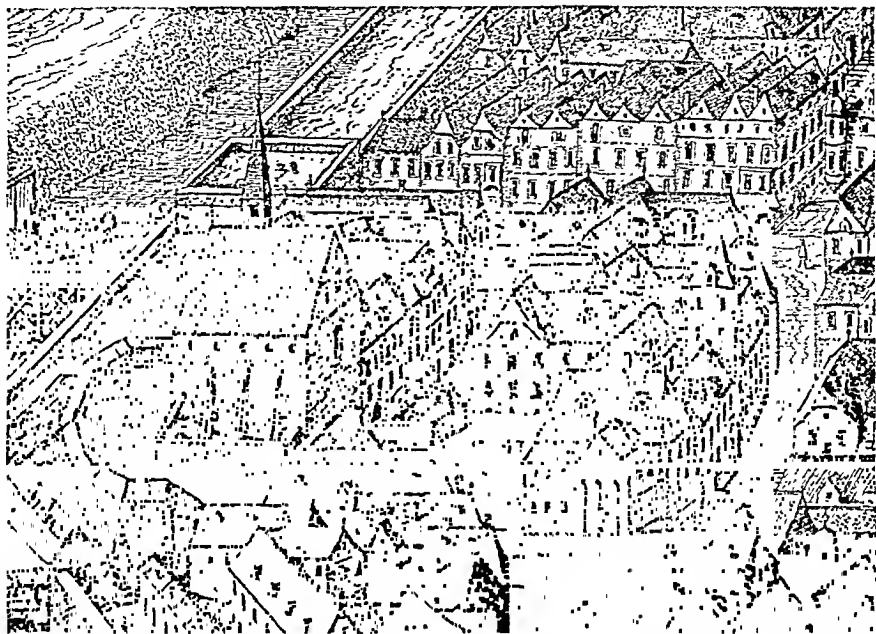
Before beginning the medical studies, the students had to be graduated from the faculty of arts, which was a preparatory school. In order to obtain the bachelor's degree, the student had to be twenty-two years old and was required to have attended lectures on Johannitius, the *Ars parva* of Galen, a part of the Canon of Avicenna, and the Ninth Book of the *Liber medici-*

nalis of Rhazes. The examination for the bachelor's degree was given in the presence of two doctors. After having discussed a medical thesis, the candidate had to take the oath that he would never practice medicine in Vienna nor in the suburbs, without obtaining the license from the Medical Faculty.

The bachelor, who had attended only theoretical lectures without seeing either a cadaver or a patient, then had to join one of the doctors, accompanying him in his visits to patients and at the same time attend lectures very diligently. The whole course of medicine had to take not less than five years. After this time the bachelor was permitted to take the examination *pro licentia*, that is, for the license. The college of doctors had to decide upon his admission to the examination, and if the application was favorably accepted, the candidate was solemnly presented to the chancellor of the university and invited him to attend the examination. All members of the faculty gathered early in the morning of the day, which had been set, and two of them asked the candidate one question each: one concerning an aphorism of Hippocrates; the other on the *Ars* of Galen. The bachelor had time until two o'clock in the afternoon to prepare his answers, then the faculty gathered again to judge the answers. Any one of the doctors had the right to put questions or to ask for an explanation. The candidate was forbidden to use any notes; he was permitted to have only before him the book which was the subject of the examination. After the end of the examination, all doctors who were present had to cast their vote. If the vote was unanimous or at least if the majority was favorable, the "promotion"; that is, the license was granted, and the conferring of the doctorate took place. It is interesting to note that sometimes the license was not granted because the moral behavior of the candidate was judged to be objectionable. In 1405, the Rector of the School of the Scots, Johannes, who



Seal of the Medical Faculty (1404).



The University (center) in the BESCHREIBUNG DER STATT WIENN by Jacob Hofnagel (1609).

had early obtained the degree of Bachelor of Arts in Medicine, was refused the license, and was invited to present himself again "after having improved his behavior according to the laws of honesty." In other cases, the degree was given only under certain conditions. In 1414, the bachelor, Stephen Speczhard, was admitted to the examination for the license, under the condition, however, that if he should pass the examination "he would not practice medicine in Vienna, but return to his native country, and not come back to Vienna if he should not have ceased to behave in his childish way, sometimes as an actor, as he has behaved during his studies in Vienna."

The graduation took place generally in the Cathedral of Saint Stephen, in a way similar to that at Bologna. The candidate held a discussion on a medical subject, then took the solemn oath and after that the presiding doctor offered him the distinctive insignia, the doctor's cap and the diploma. The new doctor then delivered a kind of probationary lecture, followed by a discussion with a member of the college.

Finally, the doctors and the guests took part in a solemn procession and went to attend a sumptuous banquet.

All doctors who lived in Vienna and in the suburbs formed the Medical College and were ranked according to the date of their degree. Two meetings were called every year for the election of the Dean. The invitation to the meeting was made through the beadle, and the acts of the meeting were inscribed in a book in which the most important facts concerning the faculty were noted by the Dean. The record of the arts faculty begun in 1399 gives us a very interesting chronicle of the life of students and doctors, of lively discussions and sometimes of quarrels between young and old doctors, and about the honors to be paid to one or the other member of the faculty. In the meeting of 1429 the Dean called the attention of the doctors to the fact that each of the other three faculties had a patron saint in whose honor a solemn service was celebrated every year, and he proposed that the two holy physicians, Saints Cosmas and Da-

mian, be nominated as patrons of the Medical Faculty. On September 25th of the same year, a solemn mass was held in St. Stephen's Church in honor of the saints, at which all doctors had to be present in academic costume.

In 1385 the Duke bought for the university, near a great cloister, a house in which the first college was established. Twenty years later the Duke bought three houses in the neighborhood for the college. The first college was inaugurated at the beginning of the year 1385, and we know that in January of the same year carpenters were working on the chairs and the benches for the medical school. It was a one-story house in the place opposite to that occupied today by the Academy of Sciences. There was the *Magna stuba collegii*, the hall where examinations and faculty meetings took place, and in which, up to 1426, the solemn celebrations were held. On the first floor there were two class rooms, one for the students of theology,

the other for the arts students. Below there were two more classrooms.

The first college was called *Collegium ducale* and was only for the students of theology and the artists. In 1384 the Duke bought from the Bishop another house in the *Schulstrasse* where the school of the lawyers was situated.

At the beginning, the rooms in the *Collegium ducale* were already too small to contain all the students, and the first to complain about it were the arts students who asked to have the great hall of the theological faculty. However, as they very often wrote their names or other inscriptions on the walls the rector of the School of Theology did not like to have them as guests. Therefore, the arts students, among whom the medical students were in the majority, asked that one room be made out of the two rooms which had been the classrooms of the theologians and of the artists, but this, too, was not sufficient, and in 1423 a new house was bought in the street



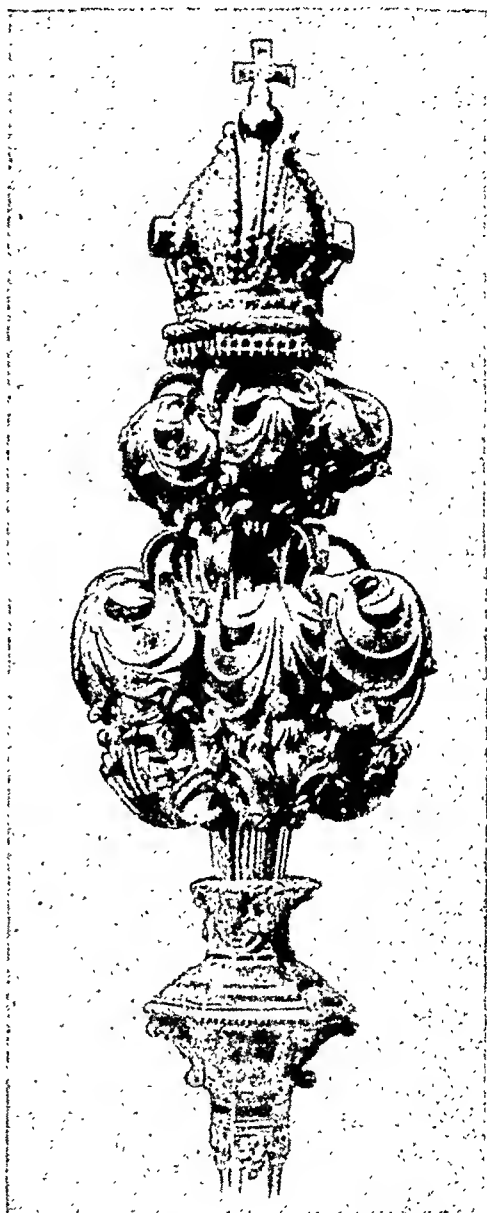
The laparotomy performed by Dr. Mathias Cornax in Vienna on November 10th, 1549.
(Original sketch in the University Library, Vienna.)

which, up to our time, bore the name of *Wollzeile* where for some time the students had enough room for their classes.

With the acquisition of the new houses, the university began to plan the establishment of a library, but the program was very slowly realized. It is interesting to recall that when Dr. Johannes Geus bequeathed a book to the faculty it had to be kept in the library of the college because the faculty did not yet have its own library. In the year 1461 there were so many gifts of books and new acquisitions that it was decided to devote a room in the house of the arts students, which had been a part of the lodging of the beadle, for the library. From this time on the medical library grew very quickly, but unfortunately it was near the kitchen of the college, and, therefore, always in danger of fire.

It was soon evident that the students had to have an opportunity of learning in a hospital. In 1492, Master Leonardus Frumman in his will left to the faculty a generous gift of 300 Hungarian florins, to buy a house "*pro infirmaria et hospitali*"; some months later, the faculty bought a new house situated opposite to the college. But very soon it was clear that this house, situated in the center of the city, and next to the college, was not the best place for the hospital, and it was therefore rented for private use. Then in 1510 the faculty bought another house which was used as a hospital, and in which 6 students had the right to be accepted.

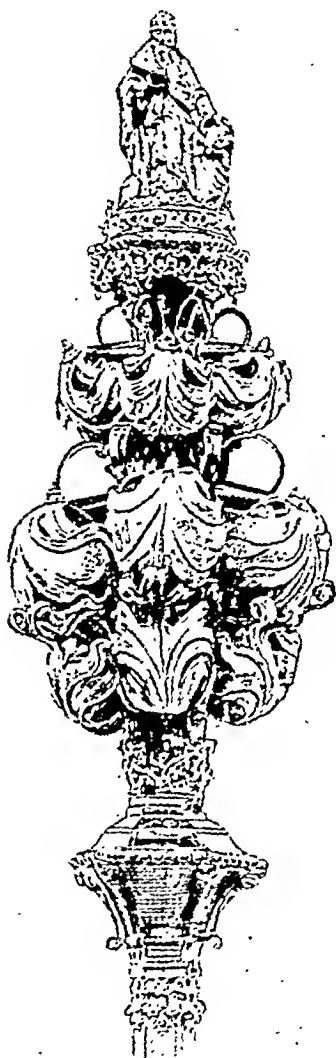
A great rôle in the history of the Viennese University was played by the *bursae*. In the language of the university, the Latin word *bursa* meant the sum which the student and the bachelor had to pay weekly to contribute to the expenses of the university. But very soon institutions were founded which gave the poor students the money for the *bursae*, the oldest of these at the Sorbonne in Paris. Later the name *bursa* was given to the foundation which granted the student the sum necessary to pay for tuition as well as for lodging and



The scepter of the Rector (16th century).

board, to which often a sum for heating was added.

The houses in which the students lived were later also called *bursae*, first in Paris, then in other European universities (in Bologna and Padua where they were called colleges). There were two kinds of *bursae*: those that were founded by institutions, or by private persons who liked to provide



Scepter of the Medical Faculty.

in a generous way for the life and study of poor students, and others which belonged to landlords or to masters who rented houses, and required a regular contribution from the students. The announcement that rooms for students were available was called *cameras proclamare*, and was made through a poster at the door of the college. The university regarded with

favor especially from the point of view of discipline, the fact that many students lived together under the direction of a master or bachelor. In 1388 the greatest number of students living in the *bursae* belonged to the Faculty of Arts. Many of these houses were in very modest condition and were occasionally used also as lodgings for foreigners or as stables. When King Sigismund came to Vienna in 1419, order was given that stables for the horses of the King and his retinue should be prepared; the university applied to the marshal asking that the *bursae* should not be used as they were absolutely necessary for lodging students.

The houses where students lived had to be closed at night at a time which had to be announced by the ringing of a bell. After this time, no students could stay out of the house, and if one of them was found at night on the streets he was fined 60 den. when he was not armed, and 1 fl. if he had arms or a musical instrument with him. If it proved that he had opened the door and left the house of his own will, he was punished by expulsion from the *bursa*, loss of privileges, and prohibition to attend lectures. Students who did not have an opportunity to enjoy the privilege of a *bursa* and did not have sufficient means to provide for themselves, found a lodging in the *codria* which were houses for indigents, also under the direction of a master. Six of these houses existed up to 1450. Life in these houses was much freer and less controlled than in the *bursae*, and many students who could have lived in the *bursae* preferred the *codria* where they felt better, and supervision was not too strict.

Among the most important and famous *bursae* in Vienna we cite the *Rosenburse*, which was the oldest, having been founded in 1419; that of the Silesians, instituted by some rich citizens of Breslau; the *Lilienburse* founded in 1450 for ten students or bachelors from Wuerttemberg, and the *Bursa Haidenheim* for which a Dr. Taler in 1585 left a generous contribution.

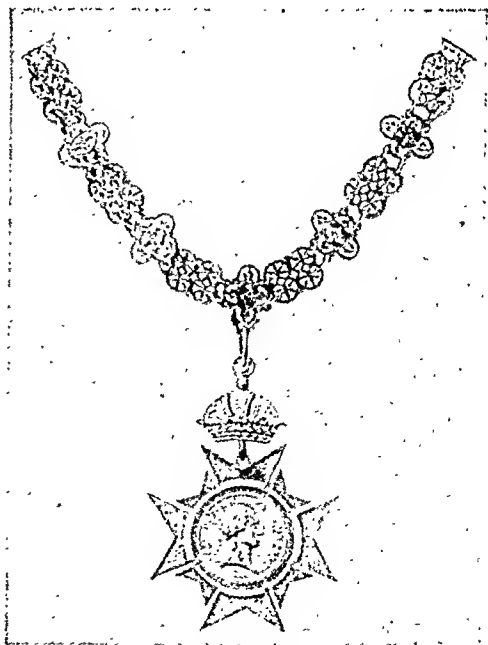
THE VIENNA SCHOOL OF THE EIGHTEENTH CENTURY—FROM GERARD VAN SWIETEN TO JOHANN PETER FRANK

ARTURO CASTIGLIONI, M.D.

AT THE end of the 15th century a mighty current of humanism in Italy awakened the interest of educated people all over Europe in classical studies. The great humanist and scholar, Aeneas Sylvius Piccolomini, who became Pope Pius II, was one of the great advocates of the new current. At the time of the Emperor Maximilian I, who generously protected the scholars, literati and poets who flocked to Vienna, a chair for poetry and rhetoric was instituted at the university. But at the beginning of the 16th century political conditions in Austria and Vienna were very bad, especially in consequence of the religious wars and the events which accompanied the Reformation. Foreign students did not come to Vienna, and even the sons of the Viennese aristocracy preferred to go to Italy or to Paris. It was at that time that the intervention of an intelligent ruler once more helped to raise the university to the height of the new times. In 1533, King Ferdinand I ordered a series of measures which culminated in the so-called "new reformation" of 1544.

The State assumed the right to supervise teaching and learning at the university, to nominate the teachers and to establish the programs. It was the intention of the ruler that the university become a fortress for the defense of the State and of the Church in case of a new rebellion. In 1623, Emperor Ferdinand II created a close union between the College of the Jesuits in Vienna and the university, and gave to the college the right to appoint the teachers at the theological and the philosophical faculty. The medical faculty,

however, was not put under the direct control of the Jesuits and was, therefore, able to maintain a certain independence. But the faculty was in a period of decadence, just when Padua and Bologna, in Italy, had their most glorious epoch, and the renaissance of science attracted to the universities students of all countries. At the same time when Vesalius was teaching at Bologna, and regular instruction in anatomy with anatomical dissections was instituted in many Italian universities, the teaching of anatomy in Vienna was very poor, so that students from Austria, Poland, and Hungary began again to travel to Italy where they believed they could still find a free education.



Chain of the Rector of the University.



The old University building, used until 1884.

Conditions at Vienna did not change for a long time. They were so bad that a decree of 1703 ordered that the conferral of the doctorate in law and medicine be suspended because of the low standing of learning.

It is only in the 18th century, during the reign of Maria Theresa, who began to introduce in her states a new and broader conception of the rôle of the universities, and of the great importance that these high schools had, not only from a cultural, but also from a political and economic point of view, that a new epoch in the history of the Vienna schools began.

The Habsburg dynasty was at the peak of its power. Austria dominated not only a great part of the ancient Holy Roman Empire, but also Italy and the Netherlands. From Italy and the Netherlands came the current of thought which gave a new impulse to the scientific orientation of the Vienna school.

The school of Leyden had become the center of medical studies in Europe in the first half of the 18th century. Hermann Boerhaave (1678-1738), a clinician of great intelligence and deep understanding, had acquired a reputation as the best doctor of his time, and from all parts of Europe students flocked to Leyden to attend his lectures. It was at Leyden that the system of clinical teaching was introduced, following the example of Padua, where Dutch students had been the pupils of Montanus, who first had introduced this method of teaching in the wards of the hospital.

From Leyden a great pupil of Boerhaave, the Hollander, Gerard van Swieten (1700-1772), was called to Vienna as physician-in-ordinary to the Empress, as Director of the Court Library and President of the Medical Faculty in 1745. Van Swieten can really be called the initiator of the Vienna Medical School. He began with

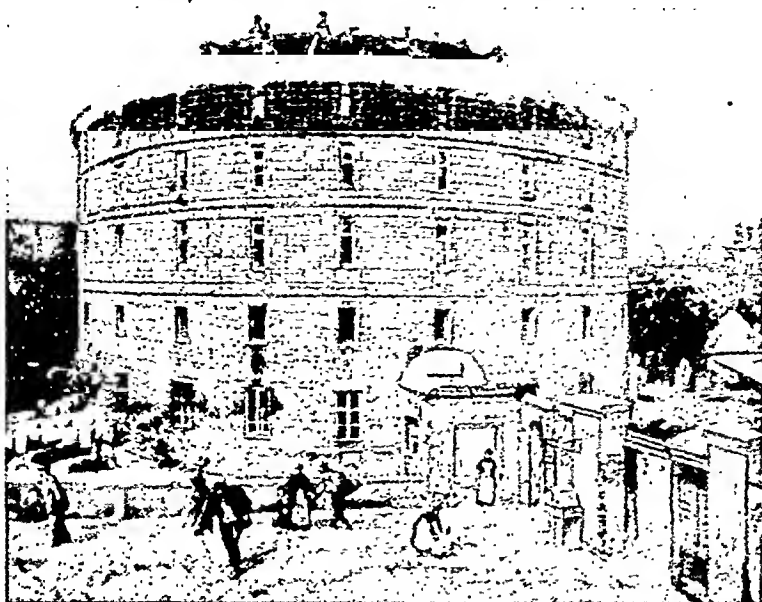


Gerard van Swieten (1700-1772).

the institution of a botanical garden, on the model of the botanical gardens in Bologna, Padua and Leyden. He introduced a systematic and regular teaching of anatomy, giving the greatest importance to dissection, and stressed the necessity of teaching the students of medicine in some branches which, up to this time, had been totally neglected, as ophthalmology and obstetrics; but the most important historical fact, which really marked the beginning of a new era in the evolution of medicine in Vienna, was the establishment of a clinic at the *Buergerspital* (the Municipal Hospital) which was inaugurated in 1754. The clinic was a very modest one; at least in the sense which we today give to this word. In fact, it had only six beds for men and six for women, and these twelve patients had to be examined and treated by the doctors and students of the medical faculty. In order to increase the number of the cases it was ordered that the patients had to move after a short stay in the clinic, and new cases were to be accepted either directly from the dispensary which was connected with the clinic or from the Trinity Hospital.

The first professor at the Viennese clinic, the oldest in any German-speaking country, was another pupil of Boerhaave, Anton de Haen (1704-1776), who was called from the Hague and was a prominent teacher and an excellent diagnostician. He began with the clinical visits, discussing the cases with the students, and teaching them the means of diagnosis and therapy; he taught them how to examine a patient and to take a history. He introduced the keeping of systematic case records, and ordered that autopsies be performed on all fatal cases. De Haen introduced and taught the use of the thermometer and the importance of taking and noting the temperature regularly, the counting of the pulse, noting its rhythm and frequency, and, in opposition to the polypharmacy of the 18th century, which was so often ridiculed by the painters and dramatists of the time, he advocated a Hippocratic therapy founded first and above all on diet and a hygienic regime. De Haen's activity had a decisive importance for the orientation of the Vienna school towards a system of rational, objective, well-founded examination and a rational system of therapy. He established the basis on which the great school of Vienna developed, so that it became characteristic for its independence and its objectivity. Vienna never took a great part in the metaphysical discussions of the different medical philosophical schools but asserted the principle, so often forgotten, that the only important place to teach medicine is at the bed of the patient, and the first necessity is to secure a correct diagnosis.

The greatest contribution to the progress of the school at this time was made by Leopold Auenbrugger (1722-1809), who inaugurated the art of physical diagnosis with his discovery of percussion as a diagnostic measure. He was the son of an innkeeper and often saw people tapping barrels in order to find out whether they were full or empty. Auenbrugger reasoned, therefore, that a cavity has a different



The ancient "Narrenturm" (tower of the insane). Painting by Pippich.
Municipal Museum of Vienna.

resonance when it is filled with air than when filled with liquid; it should be possible, consequently, to ascertain whether the chest is filled with air, as happens when the lungs are functioning normally, or with liquid under certain morbid conditions. The young doctor, who was a student at van Swieten's school, began to make observations on patients, and to control the results of his observations at autopsy. His book, entitled *Inventum Novum*, i.e., a new invention, was published in Vienna, by Johannes Thomas Trattner in 1761, the same year in which Morgagni, the great anatomist of Bologna, published his memorable book which is the basis of modern pathology.

In the preface to his book Auenbrugger says: "I here present the reader with the new sign which I have discovered for detecting diseases of the chest. This consists in the percussion of the human thorax, whereby, according to the character of the particular sounds thence elicited, an opinion is formed of the internal state of that

cavity." This small book contains fourteen observations that are portrayed in a very clear way with a sound and accurate description of the result.

The success of Auenbrugger's discoveries was not immediate. Some physicians were interested in the new discovery, but the majority were indifferent or hostile. De Haen, very conservative in his opinions, was not at all favorable to the innovation. Only when Corvisart, the famous Parisian clinician, became aware of the great importance of percussion and translated Auenbrugger's book into French, publishing it with notes and comments, did percussion become popular and was generally adopted. The small book of the Viennese author, of less than one hundred pages, was transformed into a volume of four hundred and forty pages, bearing on the title-page as sponsor the name of the most famous French clinician of the time. The first introduction of percussion in England was sponsored by John Forbes, who published, in 1821, an English translation of Laen-

nec's work on diseases of the chest containing a description of percussio.

In Vienna percussio was adopted by Maximilian Stoll (1741-1787), the successor of de Haen. It is at the time of Stoll, whose fame as a teacher attracted doctors from various countries of Europe, and whose reputation as practitioner was very widespread, that another decisive step was made in the progress of medicine. The small clinic where van Swieten had taught was transformed into a great new hospital, which became one of the most famous hospitals in the world because of the rôle that it played as a center of medical studies. The General Hospital or *Allgemeines Krankenhaus* was opened in 1784. From the beginning, it was established that this new hospital would not only offer the best medical help to the sick who flocked to Vienna from all parts of the monarchy, but would also make available to students all facilities for learning. The surgical clinic was started some years later, and in 1789 we have to note the opening of the obstetrical clinic, which was the first of its kind in Europe, and became, under the guidance of L. T. Boer (1751-1835), the birthplace not only of thousands of children but also of modern obstetrical science.

Joseph II, the enlightened ruler who introduced a spirit of freedom and independence in the government of the monarchy, made an important contribution to the progress of the university and especially of the medical school. Through his Act of Tolerance (1781) he granted, for the first time, to Jewish students the right of admission to the university, and this decision gave great impetus to a new upsurge of the school which was soon crowded by students from all parts of central Europe where such permission did not as yet exist. It is to the same Emperor that the foundation of the *Josephinum* or Medico-Surgical Academy (1785) is due. This institution was not closely connected with the university. However, being devoted to the education of military surgeons, it im-



Johann Peter Frank (1745-1821).

proved in considerable measure the education of the young surgeons, and contributed to the progress of surgery in general. The *Josephinum* was connected with the great military hospital and with a splendid collection of anatomical preparations among which the collection of wax models became very widely known.

Among the great teachers who contributed to the progress of the Vienna school, Johann Peter Frank (1745-1821), who was professor at Pavia for nine years and from 1795 in Vienna, played a most important rôle. He was an excellent clinician of the school of van Swieten. Born in Rodalben in 1766, his father wanted him to be a business man, but, after having studied philosophy, he was attracted by the study of medicine. He was the founder of a new conception of State Hygiene, or as he called it, Medical Police. Carrying out Mirabeau's idea that the health of the people was the responsibility of the state, he maintained that the government not only should take charge when the public health was endangered by widespread or contagious diseases, but should be responsible for the public health at all times.

After having practiced medicine for some time in France, he moved to Baden where he became state medical officer, and

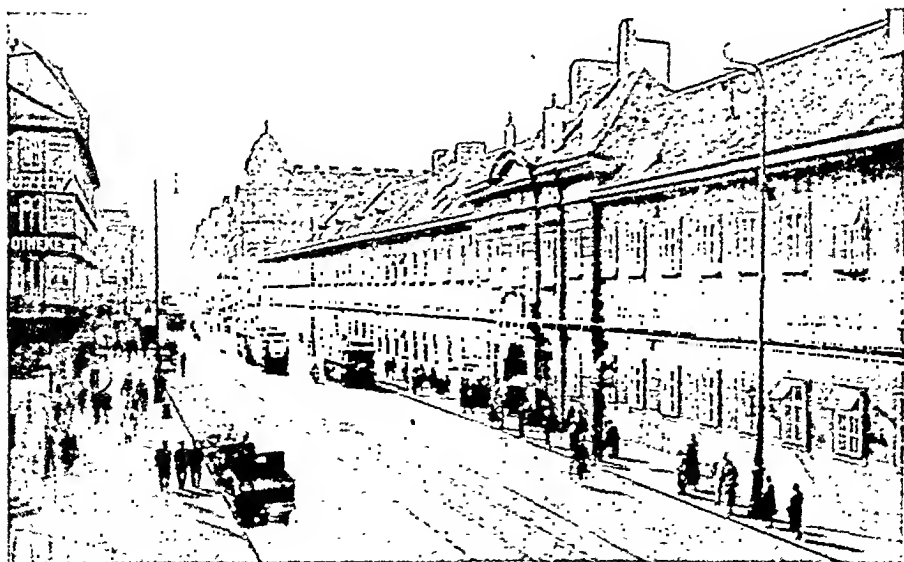
worked for many years on a book entitled *System einer vollständigen Medicinischen Polizey*. This was a complete system of medical police measures, aiming to teach not so much physicians but rather the governmental authorities how to keep people healthy. Frank was offered professorships in Mainz, Goettingen, and Pavia; he accepted the offer of Goettingen, but after one year he decided to go to Pavia where he arrived in 1785.

At this time Pavia was a center of medical education, and he found there a cordial welcome. He began a series of reforms, visited the hospitals and pharmacies, and became an expert on hospitals. In the meantime he published the subsequent volumes of his book and in 1795 he accepted the directorship of the General Hospital in Vienna where he continued his work as teacher and hygienist. He was called to Russia where he spent three years, became physician-in-ordinary to the Czar and director of the Medico-Surgical Academy, but after three years he returned to Vienna. It was the time of the Napoleonic Wars, and the Emperor consulted Frank some

weeks after the Battle of Wagram, and invited him to settle in Paris. Frank was very doubtful. He was afraid of the competition of Corvisart, and preferred to go to Freiburg and later again to Vienna where he stayed up to his death.

The work that he accomplished during the period when he taught in Vienna was, from many points of view, a remarkable one. He established the connection between the Italian schools and the school of Vienna; he was the founder of the Museum of Pathological Anatomy, and promoted the institution of rooms where patients affected by contagious diseases had to be isolated.

Frank was a man of great intelligence, noted for bon mots which were often not without sarcasm. When he had eight of his colleagues in consultation at his death bed, he said, smiling: "I call to mind a grenadier of Wagram who was dying of eight gunshot wounds. 'The devil,' he said, 'did it take eight balls to kill a French grenadier?'" Frank died in 1821, and for some time there was a decline in the study of medicine.

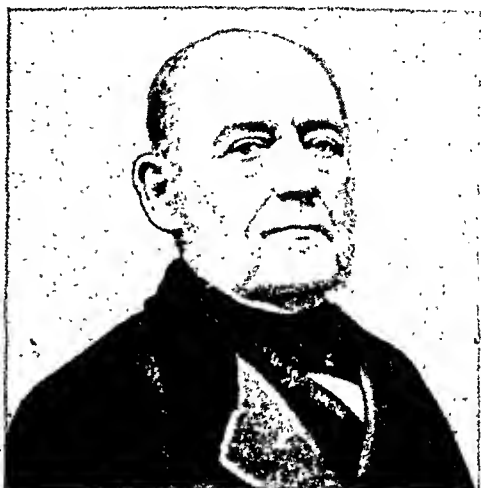


The Viennese General Hospital (*Allgemeines Krankenhaus*), showing the entrance on the Alserstrasse.

THE SECOND VIENNESE SCHOOL: FROM ROKITANSKY TO FREUD

ARTURO CASTIGLIONI, M.D.

A NEW flourishing period for the Vienna school began with two great scientists who were the founders of the so-called Second Viennese School. The first of these was Carl Rokitansky (1804-1878), born at Koeniggratz, in Bohemia, who studied medicine in Prague and Vienna, became a doctor in 1828, later prosector of the General Hospital, and in 1844 professor of pathological anatomy at Vienna. He was the first to begin the teaching of this subject in Vienna. In 1863 he became director of medical studies, in 1867 member of the *Herrenhaus* (Senate), and in 1869 President of the Viennese Academy of Science. His work as research worker and teacher was so important that he is considered the founder of the great Viennese school of the 19th century. Rokitansky was the first to collect in a systematic and exhaustive manner all microscopic pathological changes of the human body with a careful consideration of the structure, development, and pathology of the organs. Virchow called him the Linnaeus of pathological anatomy. In fact, he was inspired by a critical mind, and not at all eager to accept the dogmatic assertions of former times. He had at his disposal more than a hundred thousand autopsy reports which were written, collected and arranged in a systematic way. In 1841 Rokitansky published the first edition of his *Handbuch der Pathologischen Anatomie* which had an immense success, and was later revised and published with a great number of illustrations (1855). His histological studies began in 1843; he described the findings in endocarditis, and he was able to report his pathological observations with admirable clarity. The following quotation from his final lecture may indicate his atti-



Carl von Rokitansky (1804-1878).

tude as teacher: "Pathological anatomy has been presented by me to my students as the essential basis of pathology, physiology and the elementary doctrine for medical research. On pathological anatomy, clinical knowledge is founded, developed and perfected. It has been further developed by pathological histology, has shown the way to chemical pathology, and has called experimental pathology into being."

The scientific publications of this great scientist constitute a monumental edifice. Among his special contributions may be noted his studies on goiter (1849), diseases of the arteries (1852), abnormalities of the heart (1856), acute yellow atrophy of the liver which he named (1843), as well as important studies on perforating gastric ulcer and other subjects. He was a master at the autopsy table, and his method of performing autopsies systematically is still used. He was open-minded and willingly acknowledged the validity of the young Virchow's criticism of his unfortunate

theory of "crisis," a conception which disappeared from the second edition of his book. It is due, in the first place, to Rokitsansky that the reputation of the Viennese school increased so rapidly, that pupils from all parts of Europe came to Vienna in order to attend his lectures.

His activity as Director of Medical Studies was also very important. It was Rokitsansky who gave the impulse to the medical schools of Innsbruck and Graz, and insisted on the necessity of calling Theodor Billroth to Vienna, and Klebs to Prague. He created the first psychiatric clinic in Austria. Up to 1862, he worked in a little room, very badly protected against the weather, and only later was he able to inaugurate the new pathological-anatomical museum. A modest and sometimes shy man, he was not a great orator, nor an eloquent teacher. Nevertheless, he won the confidence of the students and of his colleagues, and his authority in the field of pathological anatomy was universally recognized.

At the same time when Rokitsansky was doing his research work, another Bohemian, Joseph Skoda (1805-1881), born in Pilsen, became professor at Vienna (1846). He had studied medicine at Vienna, obtained the medical degree in 1831, and became an interne in the General Hospi-

tal in 1833, devoting himself to pathological studies under the guidance of Rokitsansky. At the same time, Skoda was very interested in all methods in diagnostic examination. In 1841 he became the chief of a department for diseases of the chest. As a result of his activity as teacher and physician, he soon was known as one of the foremost living clinicians. He was the most popular consultant of his time, and a great number of students and doctors who admired his diagnostic ability and his clear, often witty, way of teaching, flocked to his school. The greatest merit of Skoda was that he divided his time and his studies between the Institute of Pathological Anatomy and the clinic. He tried to substitute for a diagnostic method based on uncritical observation which was common until that time, an exact objective examination founded on the discovery of Auenbrugger. He studied, not without sharp criticism, the statements of the great French clinicians, and was able to simplify and clarify their teachings. Auscultation was studied by him in the most exact way. Percussion was perfected, and his studies on the physiology and pathology of the heart, the origin of the heart sounds, the localization of murmurs, and the study of the symptoms in the vessels made it possible for him to create a new pathology of cardiac disease. In 1839, as a young man, he published his book on percussion and auscultation which is considered a classic contribution to the subject, and marks the beginning of a new epoch in this branch. The book had an enormous success. No less important, however, were his studies on respiration, the distinction between different respiratory sounds, and we may say that his observations have kept their fundamental value up to our time. It may be noted that Skoda was the first of the Viennese teachers who began teaching in German. He did not publish much, but the influence of his personality and of his clear mind had a decisive effect on the development of the school.



Josef Skoda (1805-1881).

The influence of Rokitansky and Skoda is to be recognized in the work of many other of the great teachers who were their contemporaries and their followers. The surgical clinic of Vienna had as its leader Franz Schuh (1804-1865), who had studied in Vienna and was a pupil of Rokitansky and Skoda. He became professor of surgery in 1842, and published, together with Skoda, a paper on the paracentesis of the chest and the pericardium. He punctured the pericardium for the first time in 1840. Following the teaching of Rokitansky, he stressed the importance of checking all surgical diagnoses with the help of the pathological examination. Schuh was a prominent teacher, and a good writer, but, still more, an excellent surgeon who trained a great number of good pupils.

A new school which originated at the same time, and became one of the most important centers, was the dermatology clinic. Ferdinand von Hebra (1816-1880), was a Moravian and a pupil of Skoda, who had called his attention to the importance of exact studies in the pathology of skin diseases. He worked with Rokitansky and

became the greatest dermatologist of the century, and one of the best representatives of the Viennese school at the height of its glory. Hebra was a careful and very able pathologist as well as a keen clinical observer, and was the first to establish the parasitic origin of many skin diseases which at that time were believed to be originated by a dyscrasia. The nature of papular and marginate eczema, erythema multiforme, the lichens, impetigo herpetiformis (1872), rhinoscleroma, and pityriasis, was so well described by Hebra that he is to be regarded as the creator of scientific dermatology based on pathological anatomy. His great atlas of cutaneous diseases (1856-76) is a monumental work of inestimable value. Among all the Viennese teachers of that time Hebra enjoyed the greatest international reputation, and it may be said that the whole next generation of dermatologists learned their art from him.

Hebra, with Rokitansky and Skoda, was one of the few who had the courage to defend a young Viennese physician, who, with a revolutionary idea, upset the Viennese medical world. Ignaz Philipp



The First Medical Clinic of the University of Vienna.



Ferdinand von Hebra (1816-1880).

Semmelweis (1818-1865) was the great innovator in modern obstetrics, and the courageous fighter who discovered the contagiousness of puerperal fever. Puerperal fever had rightly become the terror of women about to be delivered, particularly in hospital wards. The most extravagant theories had been proposed regarding its origin, even the suggestion that it was due to some error in diet or to the odor of certain flowers. Oliver Wendell Holmes had asserted in 1843 the contagiousness of the disease, but had met strong opposition. Semmelweis being present at the autopsy of Dr. Kolletsehka, a very gifted and diligent assistant of Rokitansky, who had died of a dissection wound (1847), noted that the pathological findings were similar to those found in women dying of puerperal fever. Once more the knowledge of pathological anatomy had shown the way. Semmelweis observed that puerperal death rates were the highest in those clinics where the students entered the obstetrical wards after coming from lectures on pathology and from the dissecting room. He ordered that all hands should be washed more carefully, and that the room should be cleaned with chloride of lime. Immediately the mortality in his wards diminished, while it continued unchanged on all the

other services. In a memorable communication to the Vienna Medical Society (1847) Semmelweis affirmed that the cause of puerperal fever could be found in blood poisoning. Immediately all the great obstetricians of Vienna arose against him and declared that his assertions were nonsense. The publication of his book on the *Etiology, Concept and Prophylaxis of Puerperal Fever* (Budapest and Vienna, 1861) let loose a new campaign against him, and even Virchow opposed him. But, as we have said, Rokitansky, Skoda and Hebra, the great leaders of the Vienna school stood by him. He left Vienna, having been forced to resign his position and, after a period as professor of obstetrics in Budapest, died at the age of 47 in an insane asylum. It was only 20 years later that his doctrine was generally accepted; the discovery of the contagiousness and control of puerperal fever marks an advance of inestimable value.

The teaching of anatomy and physiology, the fundamental subjects for medical students were entrusted to two great scientists. The first was Joseph Hyrtl (1811-1894), whose textbook of human anatomy (1846) was for many years the most popular on the subject, and passed through twenty-two editions. Hyrtl's textbook on topographical anatomy (1847) was the standard work for regional anatomy, and his dissection manual (1860), indicated a bent towards practical teaching in which he was an expert. Joseph Hyrtl was one of the most typical figures of the Viennese school, a kind man who liked to converse with the students in the most familiar way and to advise them in their studies. His lectures were always illustrated by anecdotes and historical quotations. His collection of anatomical preparations contained many thousands of items and was one of the richest in existence. Hyrtl's books were translated into many languages and made his name popular everywhere.

No less important was the part that the leading physiologist of the Viennese uni-



Ignaz Philip Semmelweis (1818-1865).

versity, Brücke, played in establishing the fame of the Viennese school. Ernst Wilhelm Brücke (1819-1892), was born in Berlin and studied medicine in Heidelberg. In 1843 he became assistant to Johannes Müller, who was the leader in comparative anatomy and physiology. In 1849 Brücke was called to Vienna where he became professor of physiology and microscopic anatomy, and for more than forty years he was a leader in research and a recognized authority in the field of physiology. Only few other physiologists have been honored as much as Brücke. He became a member of the *Herrenhaus* (Senate), director of the university, member of many of the great academies and received numerous decorations. It is through him and his work that physiological research became popular among students and young doctors; his personality exerted a great influence on the progress of science and on the dignity of the Institute which he directed. In the rooms of his laboratory, which at the beginning was a very modest one, students and doctors vied for a place to work, and he spent a great part of the day in this institute, encouraging his pupils with his suggestions. He worked in all fields of physiology, embryology and histology, and without having made any single

great discovery, he was one of the greatest teachers of his time. His work on the nature and function of the cell as an elemental organism, his studies in the field of optics, which contributed to our knowledge of the function of the human eye, were no less important than his chemical research on the problem of albuminoids. Brücke was also active in the field of phonetics, and his studies on phonetic transcription (1863), had a great influence on later studies concerned with correction of pronunciation. His lectures on physiology were published in Vienna (1873-74), in two volumes.

In this small institute in the Schwarzschanerstrasse, near the Anatomical Institute, Brücke was a dictator, and his strong rule dominated his assistants and students. He was a severe examiner, and not at all a brilliant orator, but his love for the subject, his great interest in experimentation and his devotion to his work won for him the esteem of those who were aware of the importance of his achievements. The contrast between Hyrtl, a brilliant and historically-minded teacher, interested in all subjects, witty and prone to sarcastic criticism, and the strong Brücke, who had something of the Prussian officer in the rigidity of his behavior, sometimes led to lively quarrels between the two neighbors, to the amusement of their students. The fact is, however, that both, as different as they were, contributed to the fame of the Vienna school.

At the same time the internal clinic boasted of an outstanding clinician. Johannes von Oppolzer (1808-1871) was born in Bohemia and had studied in Prague. Later he came to Vienna where he obtained the medical degree in 1835, and in 1850 was appointed chief of the Internal Department in the General Hospital in Vienna, and professor of internal medicine. Oppolzer belonged to that group of Bohemian scholars who played a paramount rôle in the Viennese school, among whom were Rokitansky, Skoda and later

Albert. Some of them spoke German with a slight Bohemian accent, but at that time national antagonisms in Austria were not yet so bitter, and the Bohemian teachers were no less beloved by the students than the Austrians, and were certainly more popular than the Germans. Oppolzer was considered one of the luminaries of the Vienna school. He had an immense practice and people came to him from all over to obtain his advice. Students and doctors crowded his lectures, and a great number of them accompanied him every day in his visits to the wards. He enjoyed the reputation of being the one doctor who never had had a quarrel with a colleague. In fact, Oppolzer had no enemies, and the kindness and cordiality with which he treated patients, making no distinction because of position or title, made him the most popular consultant. His diagnoses were famous and often quoted by students and doctors. Oppolzer was the first to assert the importance of a medicine based on sound physiological knowledge. Up to this time the Vienna school had been dominated by the anatomists and pathologists, and in consequence therapeutics had been neglected. Therapeutic nihilism, that is the system of prescribing little medicine or none at all, and only very simple treatment, was generally accepted and taught. Oppolzer affirmed that the first aim of a doctor is not scientific research, however important it may be, but the healing of the patient, and was very careful in his choice of remedies and in prescribing correctly. He was one of the first to stress the importance for the student of learning that every case has to be individualized and that the personality of the sick person plays a very important rôle. He introduced new modes of treatment such as hydrotherapy and electrotherapy. Oppolzer died of typhoid fever, having contracted the infection in the hospital during an epidemic. The tradition of Oppolzer remained alive in the Vienna school for a long time, and



Clemens von Pirquet (1874-1929).

even in the following generation he was considered one of the cherished teachers.

The institution of new clinics for special branches of medicine which, up to this time, had never been taught at the university, took place in this period. Carl Braun von Fernwald (1822-1891), was born in Vienna as the son of a doctor. He studied in Vienna, and became professor of obstetrics at the Midwives School in Trento (1853), and professor and chief of the obstetrical clinic in Vienna in 1857. He introduced gynecological teaching and a gynecological clinic was added to the obstetrical one. Frederick Schauta (1849-1919) became professor in Vienna after the death of Braun, in 1891. He had an excellent training in histology, bacteriology and radiology, and contributed greatly to the development of gynecology. His treatise on gynecology (1895-97) became popular, and his students were called to important positions in the universities of Germany and Austria. Rudolf Chrobak (1843-1910), was his contemporary, and director of the second clinic founded in 1873; he was a good operator and an excellent teacher.

The new clinic for children's diseases soon became a center of research and clinical work. It enjoyed a brilliant period

under von Widerhofer, an excellent diagnostician, very well-known also through his relations with the high aristocracy of Vienna. Widerhofer was the physician of the children of the Emperor, and therefore enjoyed the confidence of the aristocracy, but at the same time, had an immense popularity in all classes of the population. His successor was T. von Escherich to whom many important clinical observations are due, and later the chair was occupied by Clemens von Pirquet (1874-1929), whose studies on tuberculosis of childhood made his name famous. He was the discoverer of the reaction which is named after him, and was famous as a great clinician. Among the great pupils of the clinic is Bela Schick, after whom the Schick test is named. He is now at the Mount Sinai Hospital in New York.

The discovery of the X-rays soon gave rise to a great number of studies in the clinics. The great advocate of the use of the X-ray in diagnosis and therapy was Guido Holzknecht (1872-1931) to whom we owe very important original studies in this field, especially in the diagnosis of gastro-intestinal diseases, and many technical improvements. Holzknecht was one of the most popular professors of the faculty, a charming man who took great care in educating his students. He died a victim of X-rays, after having suffered the progressive mutilation of his body.

Studies in the field of pharmacology had an important center in the institute which was directed by H. Horst Meyer (1853-1935), who was the first to stress the importance of experiment in the field of pharmacology and to give to his teaching a new direction. His book, *Experimentelle Pathologie als Grundlage der Arzneibehandlung* (1910) in collaboration with Gottlieb of Heidelberg (in the 8th and 9th editions with E. P. Pick [1936]), is the standard work of modern pharmacology, and has been translated twice into English.

Among his pupils may be mentioned



Guido Holzknecht (1872-1931).

Otto Loewi (b. 1873) who was awarded the Nobel prize in 1936 for his work on the chemical transmission of nerve impulses. He was professor in Graz and came to this country after the Nazi invasion of Austria. Another pupil of Horst Meyer who came to this country was E. P. Pick (1872-) who was professor in Vienna since 1924, whose research in physiological and pathological chemistry and immunology marked important progress in this field.

Among the Viennese teachers and research workers who came to America, Karl Landsteiner (1868-1943) held a prominent place. His studies on agglutination of the blood and of the blood groups won for him the Nobel prize. From 1922 on he worked at the Rockefeller Foundation in New York and made signal contributions to the study of blood pathology.

In 1857 clinical teaching in laryngology began when Türck and Czermak began to teach the use of the laryngoscope. Türck's pupils, Stoerk and Schnitzler, were the founders of the great school which became and remained for more than

a decade the center of laryngological studies in Europe. In 1872 the clinic for otology was founded. Adam Politzer (1835-1920) was appointed in 1873 as head of the clinic. He soon became well known as a skillful operator and an expert clinician. At that time Vienna was the center of scientific activity in eastern Europe. The Russian universities were only at the beginning of their activity, and their scientific reputation was very low. The Budapest Medical School was also very young, and the schools in the Balkans and Turkey were not yet efficient. Therefore, students and doctors flocked to Vienna in order to complete their studies, particularly because at a time when the need for specialized knowledge became evident, Vienna was the only school which was able to offer, thanks to the enormous material at its disposal, the presence of skilled teachers and well-equipped laboratories, the possibility of a thorough training in the specialties. For a long time Politzer was the most popular among all otologists of Europe, and was considered a prominent diagnostician and teacher. He was a man of vast education and great intelligence, with a brilliant clinical mind and with the gift of a sharp observer. He accomplished an enormous amount of work, himself directed the dis-

pensary, supervised the work of his pupils, took care of patients who came to Vienna from all parts of the world in order to consult him, and still found the time for scientific work. His textbook, *Lehrbuch der Ohrenheilkunde* (1878) was translated into many languages and is considered a classic. It was the fame of the otological school which attracted a great number of American doctors to Vienna, and often two classes, in English, were held every day for American students by Politzer's assistant. Another attractive feature of Politzer's personality was that he was a great lover and connoisseur of art, a collector of prints and rare books, and a clever historian. His *History of Otology* (2 v., 1913), is still the best work on the subject, and is a source of information for anyone who desires to learn about the development of this branch of medicine.

Psychiatry and neurology were also the objects of special attention and study in Vienna. It was a Viennese doctor, philosopher and poet, Ernst von Feuchtersleben (1806-1849), a man of brilliant, clever mind who began the teaching of medical psychology. Ludwig Türck, in 1850, first proposed a new method for examination of descending degeneration of the spinal cord. But the great teacher whose influence on the development of the psychiatric school of Vienna was of foremost importance was Theodor Meynert (1833-1892), who stressed the importance of histological study of the central nervous system. Meynert maintained that these studies were necessary for the foundation of a scientific pathology of psychiatric disturbances. In 1870 Meynert became the chief of the psychiatric clinic.

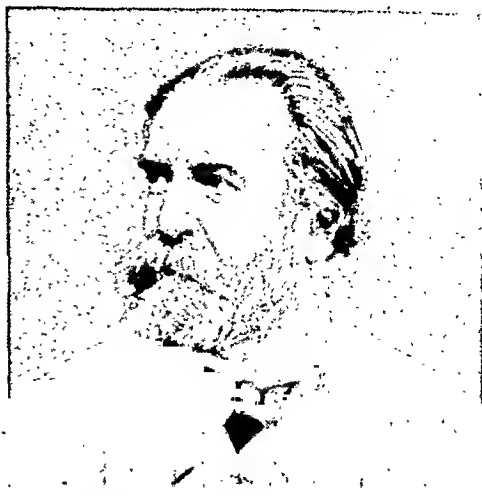
A special feature of the Viennese university was the Chair of General and Experimental Pathology, founded under the auspices of Rokitsansky, who believed that pathological anatomy is not sufficient to give a clear conception of the origin of disease, but needs to be supplemented by pathological chemistry and experimental



Adam Politzer (1835-1920).

pathology. The first professor in this branch was Salomon Stricker (1834-1898), the founder of a method of teaching which became extremely popular. Stricker, who was a small man, a poor orator, but possessed of a splendid wit, and deep knowledge not only in medicine but also in many fields of literature, liked to pose as a simple man who faces every problem with a need to understand its origin and to prove it. His lectures were full of observations, sometimes sarcastic, about events and men, and at the beginning of his lecture the students liked to ask his opinion on any fact which seemed to be of some importance and actuality. Stricker's answer was always short and sharp, but very often these impromptu answers gave a brilliant summary of the situation. It is said that when he was offered the title of *Hofrath* (that is, Imperial Councillor), which was only a formal title, a distinction usually conferred on professors of scientific renown, he refused it, observing that he believed His Majesty the Emperor would never have asked him for his counsel, and in case the Emperor should really have asked, he, himself, would have been extremely embarrassed to give a counsel to His Majesty. The writer of these lines worked for a couple of years in Stricker's laboratory at the same time as Arthur Biedl (1869-1932), who later became professor in Prague and the first teacher of endocrinology, and Max Reiner (1867-1898), who later taught orthopedics and was one of the most charming and beloved young professors of the faculty. Stricker, from many points of view, was a strange man whose aspect was not at all professorial. He was a fascinating teacher who was able to arouse sometimes by a joke, sometimes with a book or an experiment, an interest for research, and was ready to discuss with equal eagerness a passage of Dante or an experiment performed by an assistant.

The golden period of the Vienna school culminated with the nomination of



Theodor Meynert (1833-1892).

Theodor Billroth (1829-1894) as professor of surgery. Billroth, of Swedish ancestry, was born in Ruegen in 1829, obtained his degree in Berlin and became professor at the surgical clinic in Zürich in 1860. In 1867 he was appointed professor at the University of Vienna. He was not only a master and an artist who was deeply versed in surgical technique, but also a great pathologist who based his work on what he called the pathologic concept. The surgery of the gastrointestinal tract was in its beginning in Billroth's time. He was the first to attempt, after a great number of experiments on animals, the resection of the oesophagus, laryngectomy (1874), the resection of the pylorus (1881), and later many other forms of intestinal surgery. He was a fascinating teacher, a great thinker, and an excellent musician. Students and doctors gathered in Billroth's clinic with great love and deep admiration for their chief, and to be invited to an evening gathering in his hospitable house, frequented by the greatest artists and poets of Vienna, among whom Brahms was his close friend, was considered a great distinction. His school attracted the young doctors so much that to be accepted as *Operations-Zoegling*, that is, a surgical pupil, was the aim and the hope

of all young doctors who wanted to become surgeons. I remember that at his clinic after the lectures one had an opportunity to hear all languages spoken, and to see the most varied types in the audience. Love for the teacher and attachment to the school were so deep that the tradition of Billroth as a person and as a friend played an important rôle in the development of European surgery in the second half of the 19th century. Billroth's students occupied many chairs in Europe, and gratitude to the teacher was no less great than the admiration for the man. Billroth's letters are, I think, among the most interesting documents for the biography of a great

scientist and artist, and they are a precious contribution to the story of Vienna and the intellectual and artistic life in the capital of the monarchy.

Billroth's boldness in surgery gained for him the appellation of an "operator of great initiative." He was greatly interested also in military surgery and volunteered to serve in the hospitals of Mannheim and Weissembourg during the Franco-Prussian War. The figure of the handsome man, with clear blue eyes and a wide beard, was very popular in Vienna, and it was a national sorrow when he died at Abbazia, on the Adriatic, on February 6, 1894.

At the same time when Billroth was



Theodor Billroth lecturing in the auditorium of the surgical clinic.

appointed as Chief of the Surgical Clinic, a young physician who had already achieved a reputation, was called as Oppolzer's successor to the Chair of Internal Medicine at the Vienna university. Heinrich von Bamberger was a faithful follower of the teachings of Rokitansky, Skoda, and Oppolzer, well-versed in microscopy and chemistry, a famous diagnostician, and an eloquent teacher. The diseases of the heart were the special field of his activity, and his book on the subject (Vienna, 1857), was widely known. Bamberger was a master in clinical symptomatology and stressed the necessity of teaching diagnosis, not in the laboratory, but at the bed of the patient.

The great successor of Bamberger at the clinic which, for a short time, was directed by Professor Duchek who died in 1882, was Hermann Nothnagel (1841-1905). He studied and obtained his degree at Berlin, and was later assistant to Traube who considered him the best of his pupils. He became a military surgeon and was transferred in 1870 to Breslau. Nothnagel remained in the army up to 1874 when he was called to Jena, and after six years, in 1882, to Vienna. Nothnagel devoted a great deal of his work to experimental studies on the function of the brain, and his book on this subject, published in 1879, called the attention of the scientific world to its author. In Vienna, he continued his studies in the field of brain pathology, but at the same time began work on physiology and pathology of the gastro-intestinal tract. With the help of many famous scholars, he issued a monumental work, the *Handbuch der Speciellen Pathologie und Therapie*, in which he was able to collect and to offer a comprehensive picture of the development of internal medicine at his time. He wrote many other works, among which his text on pharmacology, published in Berlin in 1870, had a great number of editions, was translated in many languages, and enjoyed the greatest popularity. Nothnagel was an eloquent speaker, and his lectures were fascinating, attracting



Hermann Nothnagel (1841-1905).

the attention and the interest of the students. He was a man of vast culture, interested in all problems and able to pronounce sound judgments on many of them. He was considered the greatest teacher of the Vienna school at the end of the 19th century, and no one was better able than he to give the students not only clinical instruction but also a high conception of the moral duty of the physician and of the rôle which he is called upon to play to protect the public health.

The teacher and chief of the second Medical Clinic was Edmund von Neusser (1852-1912). He was born in Poland and became professor in Vienna in 1893. Neusser was not a brilliant teacher, but rather a great thinker with a remarkable diagnostic intuition, who was able to observe the symptomatology of diseases with such attention that he soon acquired the name of a great clinician, and was for a long time the consultant to whom patients flocked from everywhere. Neusser was a great lover of music and sometimes was able to forget everything around him while listening to a composition of Wagner or of some other composer whom he loved. As consultant he was very brief in his judgment, but always precise and decided. He contributed very much to the reputation of

the Vienna school in Austria and abroad, and his publications concerned such different fields of medicine as diseases of the liver, the blood, and the kidneys.

It was in the year 1880 that the increasing number of students made necessary the construction of a third medical clinic, which was entrusted to Professor Leopold Schroetter von Kristelli, a pupil of Skoda and an expert laryngologist. He devoted himself especially to the study of tuberculosis and advocated the creation of sanatoriums in Austria. The first of these was inaugurated under his direction in Alland near Baden in 1896.

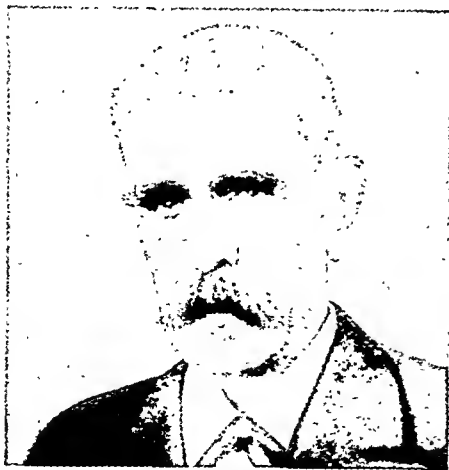
Edward Albert (1841-1900), a Bohemian by birth, was called to the surgical clinic in Vienna (1881). Albert was an excellent and eloquent teacher and his lectures were among the most popular at the university. His little book on surgical diagnosis (1882) was highly esteemed because of its precise definitions. He also wrote a great treatise on surgery (1882-83), and was the first to carry out transplantation of nerves, isolated extirpation of the capsule in tuberculosis of the joints, and the first extirpation of the thyroid. His school was the place from which many great teachers came, among them Adolf Lorenz, one of the great orthopedists of

central Europe. Anton Freiherr von Eiselsberg (1860-1939), was a leader in neurosurgery and one of the most famous of the Viennese teachers.

The chair of psychiatry was occupied in 1889 by Richard von Krafft-Ebing (1840-1903). He was the successor of Meynert and was equally famous as research worker and teacher. He was the first to devote an accurate study to the pathology and psychopathology of sexual life, and his book, *Psychopathia sexualis*, published in 1886, was translated in many languages and had more than twenty German editions. It became the most widely read book on the subject, and taught a new method of diagnosis and treatment of these psychic disturbances. His textbook on psychiatry (1879), was also translated into English and French.

Wagner-Jauregg (1857-1940), became in 1893 Director of the Psychiatric Clinic in the Provincial Hospital of Vienna and his activity marked a new era in the development of psychiatry. In 1896, after long and difficult experimental researches and clinical studies, Wagner-Jauregg announced the new fever treatment of general paralysis by means of induced malaria. This discovery, after considerable controversy among the physicians all over the world, was finally accepted as an important advance. In 1927 he was awarded the Nobel prize. At Wagner's clinic one of the most brilliant scholars began his work, which was interrupted by his early death. Constantin von Economo (1876-1931), devoted his studies to the histological anatomy of the brain and published an atlas which is a magnificent piece of exact research. He also published a comprehensive study on lethargic encephalitis (1917), in which he clearly presented for the first time the symptomatology and pathology of this disease, formerly unknown, which spread rapidly all over Europe during the last year of World War I.

To the great period of the Viennese school belonged the development of the



Julius von Wagner-Jauregg (1857-1940).

ophthalmological clinic, the leader of which was Ernst Fuchs (1857-1930), born in Vienna. Through his work the clinic became a center for research. The courses on ophthalmology at Fuchs' clinic were very popular among American doctors, and he himself was very eager to show his guests the most important cases.

Finally another brilliant contribution of the Vienna school to the progress of medicine was made in the field of forensic medicine. Professor Edward von Hofmann (1837-1897), separated legal medicine from pathological anatomy, and saw to it that the dissection of all medico-legal cases was performed in his institute. In this way he obtained an invaluable scientific material for his lectures, and was able to introduce practical and experimental teaching. His *Lehrbuch der gerichtlichen Medizin* is an excellent text for the study of legal medicine.

Vienna had been such an important center of medical studies, and the development of these studies was so closely connected with the political history of the monarchy, that it seemed to be inevitable for the ancient city, which boasted of so many glorious memories in all fields of science, to become a center of medico-historical teaching. The chair of the history of medicine, created in 1849, was entrusted to F. R. Seligmann who became full-time professor in 1869, then to Theodore Puschmann who did outstanding work in this field (1844-1899), and published a history of medical teaching (1889). In the same year he published a history of the Medical Faculty of Vienna, and inaugurated the publication of the great treatise on the history of medicine which was later published by Neuburger and Pagel. After his death, his widow founded the Puschmann Stiftung which originated the Institute of the History of Medicine at the University of Leipzig.

Puschmann's successor in the chair of medical history was Max Neuburger, born in Vienna in 1868. The activity of

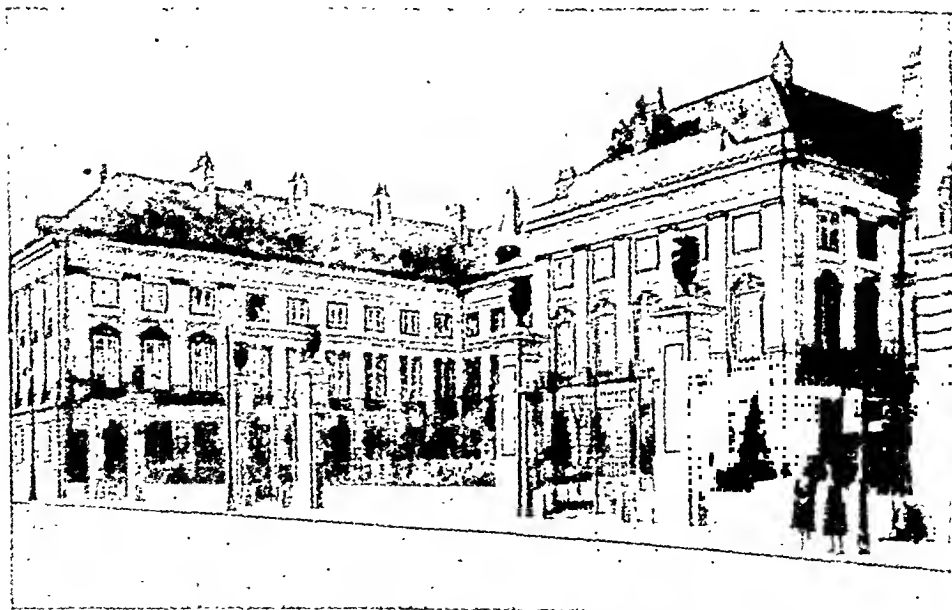
Neuburger was so important and was so intelligently devoted to all fields of medical history that the Institute in which he taught became an important center of medico-historical studies. Neuburger founded the museum of medical history in the old *Josephinum*, collected an immense number of books, objects, and prints concerning the history of medicine, brought together documents, papers, letters, medals and other objects related to the history of the Vienna school, so that the Museum was generally considered one of the richest and most precious collections of his time in all the world. Among the great numbers of books which he published I would like to mention his famous *Geschichte der Medizin* in two volumes (1906-10), which was translated into English and was the first book to teach the history of medicine from the point of view of general culture, and with consideration of the philosophical background and development. Neuburger, who was persecuted by the Nazis, and had to leave his family and his school, found a refuge in London where he is still working very diligently, and has recently made a splendid contribution to the history of the Vienna school and its relation to English medicine.

The rôle which the Viennese school played in the history of medicine is a very important and a characteristic one. Vienna was a place where people from different countries came together for their economic and political affairs, and became at the same time a center of intellectual activity, chiefly in art, music and medicine. The beginnings of the Vienna school are doubtless due to the influence of the Italians and later of the Dutch. From Leyden there came to Vienna the pupils and the doctors of Boerhaave's school and the clinical method of teaching. The great attraction that the city exerted on the cultured world of the 18th century played an important part in drawing to its schools students from all countries; the preponderant rôle which Austria and the Habsburgs played in the

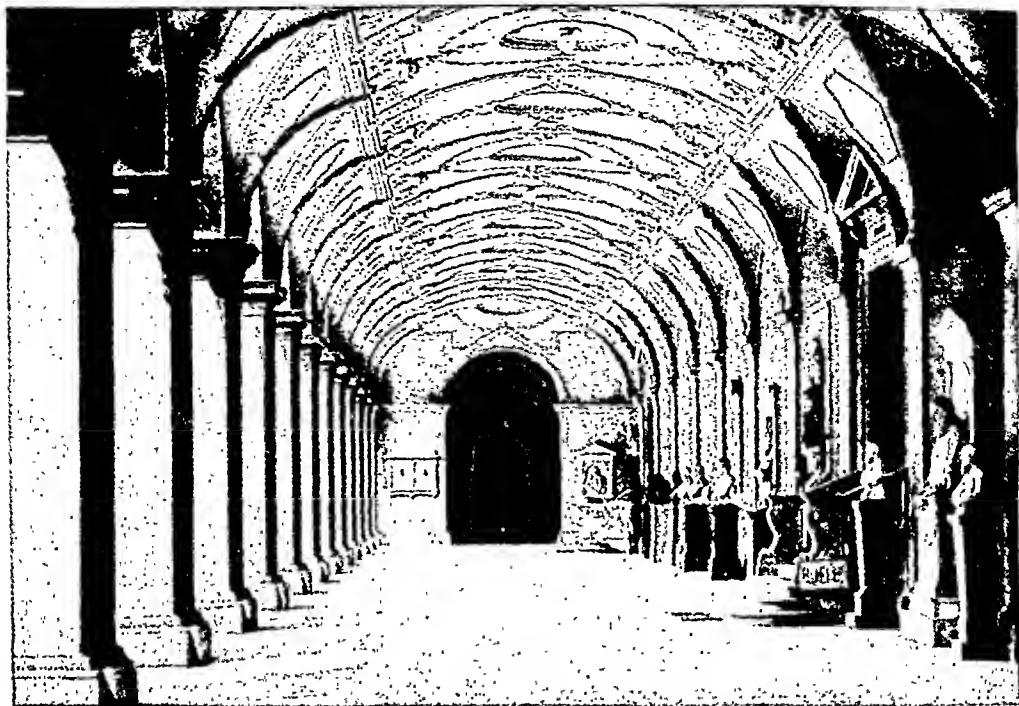
European politics had an impact also on the development of the school, which the Emperors cherished and protected, and which, unlike Bologna, Paris or Berlin, had no competition from other medical schools inside the frontiers of the state, being the only great school of the monarchy up to the end of the 19th century. Furthermore, with its fame, its great teachers, the immense material at the disposal of its clinics, and with the facilities of life in a great capital, people eager to learn were attracted to Vienna. To have been a student at Vienna, in the 19th century, meant almost as much as it had in the Renaissance to have studied in Bologna or in Padua. Vienna was, for many decades, the melting pot for currents of ideas from Poland, Bohemia, Russia, Hungary, the Balkan countries and Italy, for all the areas where the political domination of the Emperor of Austria was powerful. Austria was, like France but unlike Italy, Germany or England, a rich country

and a powerful state with one capital where all interests centered.

World War I struck a hard blow at the Austro-Hungarian Monarchy and brought to an end its power. Its territory was partitioned among Italy, Czechoslovakia, Poland, Hungary, Rumania and Yugoslavia. Austria ceased to be a great power. The position of Vienna was, therefore, changed; it was no longer the capital of a great monarchy nor the residence of a mighty dynasty and a wealthy aristocracy. Its importance as a centre of international culture was ended and the states which were formed around Austria pursued strong nationalistic policies. The interests of Russia and the Balkan states diverged more and more from Austria, and this is one of the reasons for the decadence of the university. The number of students grew smaller and the small state could not face the enormous expenses connected with the maintenance of a well-equipped modern medical school.



The "Josephinum," the old Military Academy which now houses the Medico-Historical Museum.



The arcades of the University with the busts of the great teachers of the medical faculty (first at right, Theodor Billroth.)

Immediately after the War, however, the school of Vienna once more became an international centre, and a great teacher attracted to Vienna students and doctors from all over the world, achieving fame which was surely more widespread than that of any other of the great scholars who had taught at the school. His name became famous not only in the medical world, but also among persons interested in other forms of intellectual activity. Sigmund Freud (1856-1939), born at Freiberg in Moravia, was the creator of a revolutionary doctrine which led to an upheaval in the field of psychiatry. His doctrine was based on the fundamental assumptions first, that the memory of previous events stored in the subconscious mind plays an important part in the mental life of an individual, and secondly, that the mental conflicts often produced by such memories can be removed when they are brought to the surface and properly com-

prehended by a long process of search into the subconscious zone. He also stressed the existence and importance of infantile sexuality and affirmed that hysteria was due to a psychic trauma of a sexual nature. Freud was able to help many cases of hysteria and other functional disorders by the use of psychoanalysis. He was the creator of the so-called Oedipus-complex, deriving from the unconscious conflict in the young child's sexual attitude toward its parents.

Freud began his studies with Breuer, a Viennese physician, in 1884 and published his first book on hysteria in 1895. He worked alone at psychoanalysis for ten years, and in 1908 the first international congress of psychoanalysis took place. It was after the World War that the spread of the Freudian doctrine in all countries of the world was accomplished. When Freud celebrated his seventieth birthday in 1926 the unanimous participation of schools from all countries created the impression

that a great teacher of the Vienna school had once again been able to revive the ancient, glorious tradition of the university.

There is one aspect to which it seems worth calling attention, that is the great rôle which art and all kinds of artistic manifestations played in the personal life, and in the intellectual evolution of many of the great teachers of Vienna. I have referred to the love for music and the deep understanding of it, which were characteristic of such men as Billroth and Neusser, two of the most prominent clinical teachers, but many others, for instance, Skoda, Oppolzer and Dittel were good musicians, and the drawings of Bruehl, Salzmann, Pilz and many others were considered works of art.

But it is especially in the field of literature that the Viennese doctors made many important contributions. I have referred to the physician and poet Ernst von Feuchtersleben, who was considered one of the best lyricists of his time; many of his poems are often quoted in anthologies and show his acute psychological insight. Ludwig August Frankl-Hochwart belonged to the school of Uhland and Lenau. He left many poems, among them a satiric one, entitled *Hippocrates und Moderne Medizin* (1853). It is a dialogue between the great Master and a barber who visits the General Hospital with him and shows him the most important achievements of modern medicine.

The famous Austrian poet, Nikolaus Lenau (1802-1850), was a student of the Vienna Medical School and practiced in Vienna before he left for America.

Ernst Brücke, of whose work in the field of physiology we have spoken, wrote some books on esthetics which were much discussed and enjoyed considerable popularity. His studies on Italian painting revealed critical originality and a deep knowledge of Italian art. Theodor Meynert, the famous Viennese leader in psychiatry, published many poems which won for him a reputation as a poet. Stricker

wrote some important papers on problems of art, and especially on the painter Boecklin. The profound knowledge of Krafft-Ebing in the field of literature is shown by his study on sexual psycho-pathology in the works of the ancient poets. Eduard Albert, the surgeon, translated many Czech poems into German with considerable success. Finally, I must refer to another student of the Vienna school, Arthur Schnitzler, son of the professor of laryngology, and brother of Julius Schnitzler the director of the Surgical Clinic of Vienna. Schnitzler was a physician and belonged to a medical family, in which the tradition of the great school was alive. He is generally regarded as the leader of the Vienna literary school at the end of the 19th century, and his short stories and novels, many of which were translated into various languages, were immensely popular.

But there was another factor, which is not so easily analyzed and described, which played an important rôle in the attraction that the medical school of Vienna exerted and which contributed to its great fame all over the world. This was Vienna—Vienna itself, through its geographical position, through the natural beauty of its surroundings; the splendid art collections in its museums, where the Habsburgs had gathered precious objects of art; its theatres which were among the best in Europe; and, last but not least, the cordial hospitality and kindness of the inhabitants, who were ready to accept foreigners from all countries. I do not believe that there were many other cities where the foreign students soon felt so much at home as in Vienna. And this fact is eloquently illustrated by the large number of American physicians at the university.

William Osler had been one of the first to go to Vienna. Rokitsansky and Skoda were still active, but they were old men, and it was the specialists around whom the American doctors gathered. When I was a student at the medical school between 1890 and 1900, the American doctors who

came to Vienna to attend courses gathered in a little cafe opposite the main entrance of the General Hospital. In the small and very modest cafe, doctors of different countries used to meet, chiefly Italians and Americans, and it was there that I had my first contact with my American colleagues. At that time there was no organization of the American doctors. In 1903, Doctor Ravold of St. Louis suggested the creation of the American Medical Association of Vienna. In fact, the association was organized at the Hotel Hammerand some months later, and Doctor Ravold was elected the first president.

In the period after World War I, which was for Vienna a time of great economic depression, the Social Democratic Party, which was in power, was successful in its efforts to protect public health and improve the condition of the common man. An important rôle in this work was played by a professor of the medical school, Julius Tandler, born in 1869 in Iglau in Moravia. He had been a student of the anatomist E. Zuckerkandl and became professor of anatomy in 1910. He was an intelligent man with progressive ideas, interested in social problems. He became Secretary of State for Public Health in 1919, and then chief of the committee for medical care and public health in the city of Vienna. After the fall of the Social Democratic government, Tandler resigned his office and went to China as consultant of public health, then to Russia where he assumed a high position in the direction of sanitary institutions. He died in Moscow in 1936.

The political struggle in Vienna in the last years before the War, the invasion of Austria by the Nazis and finally World War II, which destroyed what remained of commerce, industry and cultural life in Austria, had a great influence on the Vienna school. A large number of the teachers were jailed or exiled after the introduction of the racial laws, Jewish students were forbidden to enter the univer-

sity, and Jewish doctors were no longer permitted to practice. The publication of articles and books by them was prohibited, and the existence of thousands of people was made impossible. Many of them found a haven in foreign countries; the most famous among them in the United States.

The last page that the historian of today is able to write about the Viennese Medical School, which has left so great a mark in the history of medical progress, is a very dull one. It is a period of decay in the history of teaching and learning at Vienna. What its history will be in the future, if it will be possible for it to assert once again its great traditions, it is difficult to say. But one thing is certain, that the pleasant recollection of days spent in the hospitable city, of the teaching of great scholars, of work accomplished in the laboratories, will remain a lasting memory in the minds of all those who were directly connected with the medical school of Vienna and with one or the other of its great teachers.

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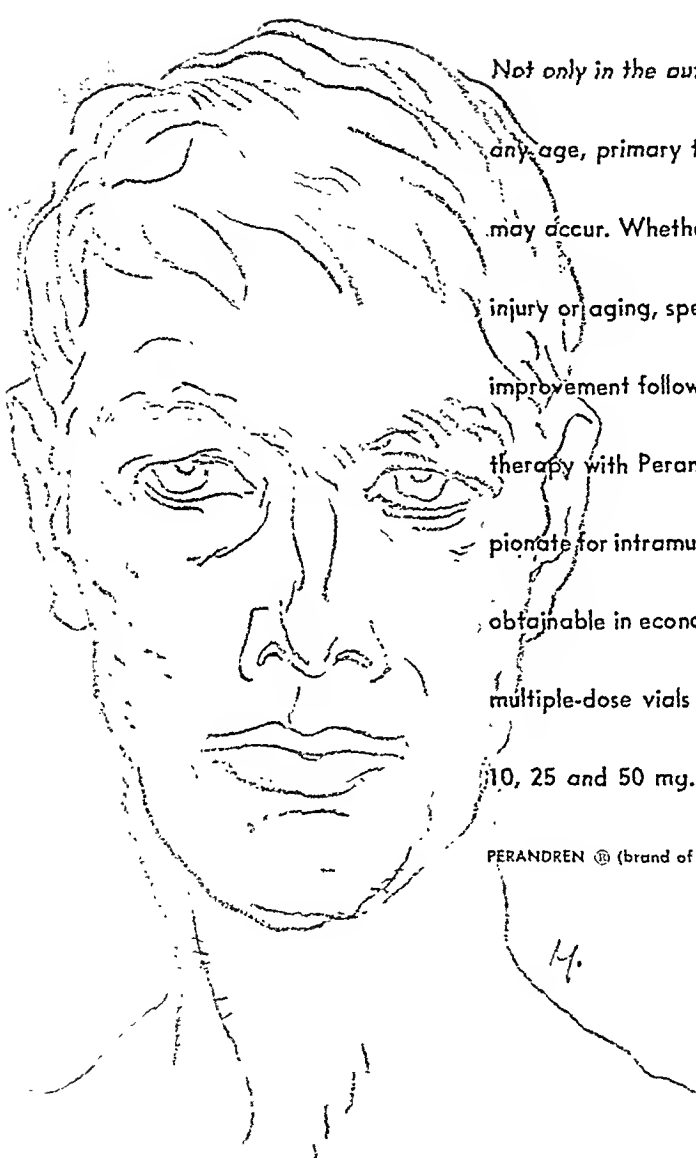
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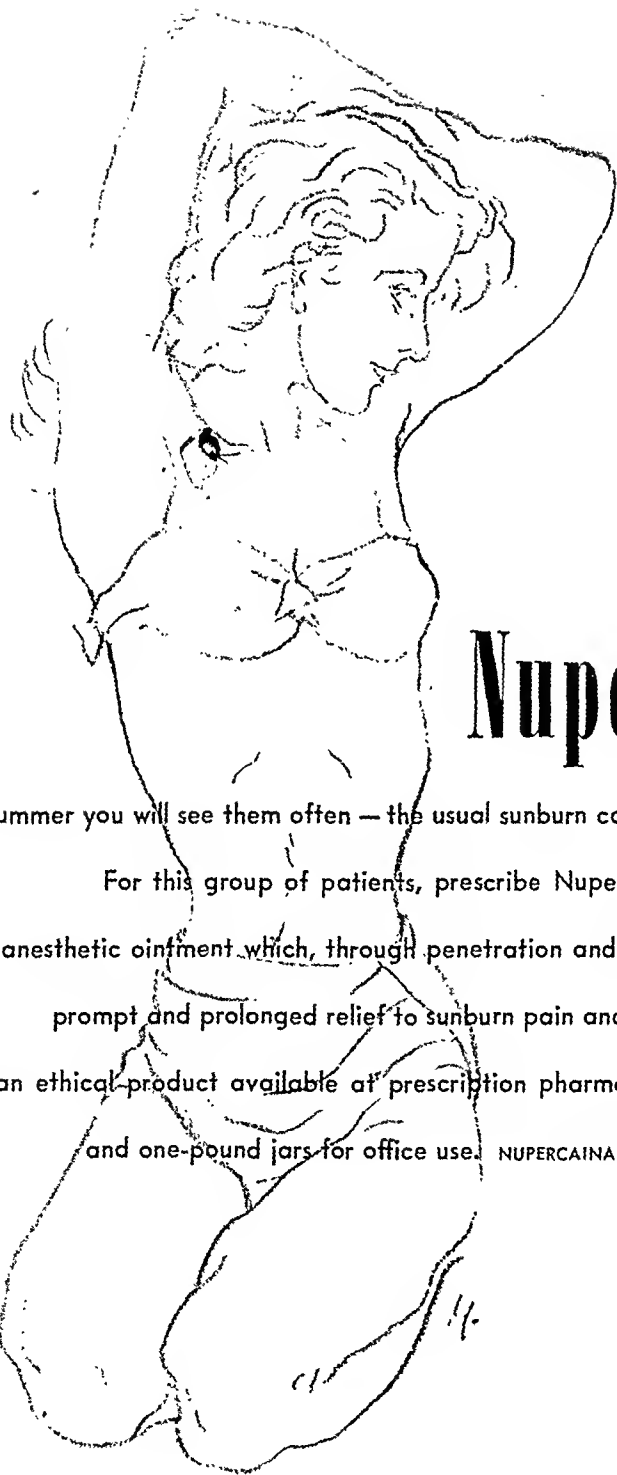
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PHYSICIANS
OF THE FRENCH REVOLUTION



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PHYSICIANS OF THE FRENCH REVOLUTION

DR. A. G. CHEVALIER

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PUBLISHED SOLELY FOR THE INTEREST OF THE MEDICAL PROFESSION
BY CIBA PHARMACEUTICAL PRODUCTS, INC., LAFAYETTE PARK, SUMMIT, N. J.

IN CANADA: CIBA COMPANY LIMITED, MONTREAL

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ASSEMBLIES (ASSEMBLÉES) OF THE FRENCH REVOLUTION

The States-General (May 5, 1789 — June 17, 1789).

1118 deputies. The Estates meet in separate halls.

Nobility: 250 members (liberal minority: approximately 50; among them the Duke of Orléans and Lafayette).

Clergy: 291 members (among them 200 "lower" clergy, of whom a section sympathized with the Third Estate).

Third Estate: 577 members.

The National Assembly (June 17, 1789 — September 30, 1791, as **Constituent Assembly** after July 9, 1789).

149 of the clergy and 47 nobles join the Third Estate. The composition after July 9 is similar to that of the States-General, except that now all three groups meet together. On October 16, 1789, 200 deputies, hostile to the revolutionary movement, leave the assembly.

The Legislative Assembly (October 2, 1791 — September 20, 1792).

745 deputies.

Left (245 Seats)	Center (236 Seats)	Right (264 Seats)
136 Jacobins, known as the "Mountain," because they occupied the highest rows in the chamber.	109 "Brissotins" the adherents of Brissot, later known as the "Girondists" after the deputies from the Gironde Département.	Independents
Robespierre opposed to any war.	Brissot for the "great" war against Austria.	Feuillants for the Constitution of 1791, for a "small" war against the Rhenish electors and the émigrés.

The Convention (September 21, 1792 — October 26, 1795).

749 deputies: 77 from the old Constituent Assembly

81 from the Legislative Assembly

491 new deputies

Left (69 Seats)	Center (500 Seats)	Right (180 Seats)
The Jacobins break up into 4 parties: Adherents of Marat Hébertists Adherents of Robespierre Danton's Party	The "Plain," without political orientation, at first cooperates with the Girondists who are numerically superior to the party of the Mountain.	The Girondists accuse the Robespierrists of aiming at a dictatorship and demand the indictment of Marat.
accuse the Girondists of aiming at setting up a federalist republic. Robespierre seizes power: Marat murdered on July 13, 1793. Hébertists executed on March 24, 1794. Danton and followers executed on April 5, 1794.	Intimidated, the "Plain" supports Robespierre.	The Girondist leaders are executed on October 31, 1793.
Robespierre rules to July 27, 1794 (9th Thermidor). He and his supporters executed on July 28 and 29.	The "Plain" supports the Thermidorians.	Rule of the moderate Thermidorians.

THE PHYSICIANS IN THE REVOLUTIONARY ASSEMBLIES

DR. A. G. CHEVALIER

THE "Assemblies" of the French Revolution must be regarded as a direct expression and as indicators of the revolutionary movement. In the course of its development the royal power was irresistibly whittled down, until finally the executive power passed completely to the "Assemblies."

The deputies of the assemblies came from all the classes of the population with the exception of the working class which was then still politically insignificant. French medical historians, such as Achille Chéreau, Antoine Constant Saucerotte, Miquel-Dalton, Maxime Laignel-Lavas-

tine, repeatedly have attempted to trace the behavior of the physicians who were members of the assemblies. Basically, however, they restricted themselves to a presentation of the political attitude of the physicians, and to describing their participation in the revolutionary movement. It is not unimportant, however, to present and to illuminate the circumstances and facts, which, in addition to the purely political events, led the physicians to participate in the revolutionary assemblies. From a medico-historical point of view it is of particular interest to determine the extent to



On August 10, 1792, the excited populace enters the Legislative Assembly, to which the royal family (right, behind the bars) has come for protection. Drawing by François Gérard (1770-1837), Louvre, Paris.

faculty enmeshed in its theoretical disputes. Similarly intense activity was manifested by the professors of the Jardin des Plantes, established in 1671, and by those of the Collège de France, founded in 1530, but most active was the Société Royale de Médecine which was particularly interested in establishing a connection with all the physicians in France who were occupied with the investigation and control of epidemic diseases.

In the critical years around 1789, when only the concentration of all energies would have been able to maintain the authority and esteem of medical science, the effects of the struggle within the camp of medicine itself could not but be disastrous. Even worse was the fact that unbelievable abuses existed within the faculty itself. In consequence of the increasing lack of funds, plans were conceived for the collection of money; academic



The famous obstetrician, René Levasseur (1747-1834), who was a member of the Jacobin party in the Convention. Lithograph.



PÉTITION DES CITOYENS DOMICILIÉS A PARIS,

De 8 Décembre 1788.

LE ROI et toute la Nation. Comme un bon Père, il s'intéresse de sa Famille. Il va chercher le bonheur où il peut l'acquiescer le mieux, dans le bonheur de tous et des qui admettent leur Père. Il fait tout pour eux; ils font tout pour lui.

Un abîme effrayant s'est ouvert aux yeux du Roi & de la

Title-page of the petition which Guillotin wrote on the convocation of the States-General and which was published by the guilds. First edition of 1788.

degrees were made purchasable, and the costs of graduation became unattainable for poorer students. The number of physicians decreased constantly; there were hardly six or seven graduates annually in Paris, and from 1786 to 1789 there was not a single graduate from the medical faculty of Paris. Only sixty students were inscribed in the Faculty as compared with 100 at Montpellier. For the study of anatomy, two dissections annually had to suffice. There was no clinical instruction, no facilities for students to work in hospitals, even in obstetrics the teaching was restricted to theory. Repeated demands were raised for reforms, and not only from medical circles. Diderot and other Encyclopedists exposed the abuses in the Faculty. In 1790 Félix Vicq d'Azyr (1748-1794), secretary of the Société de Médecine, worked out a plan for a thorough-going reform, which in its polemical portion portrays best perhaps the state of the Faculty at that time. The teaching was defective, the number of teachers too great for the

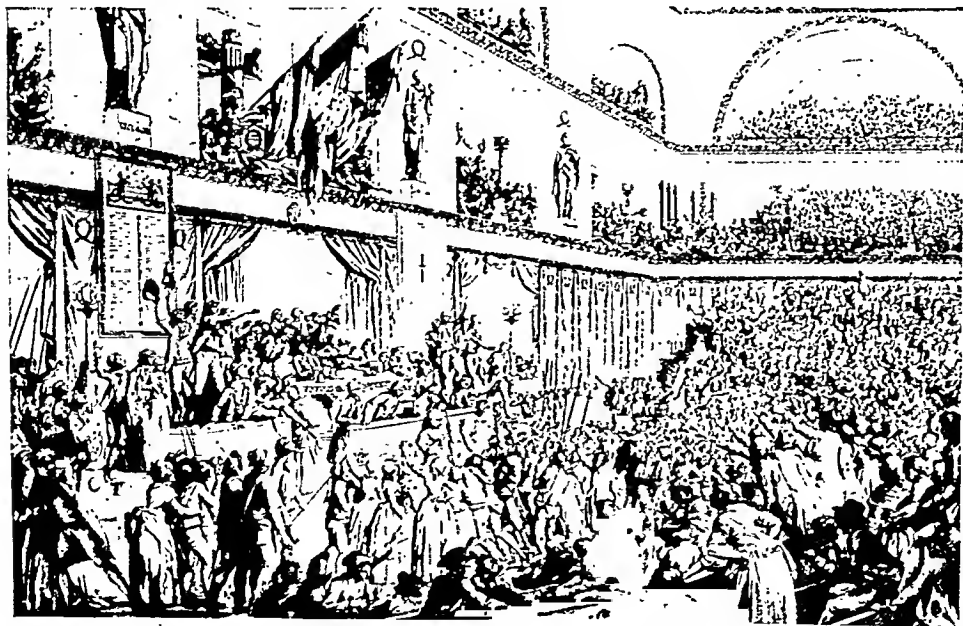
small number of students, the organization too antiquated and complicated, and the hospitals poorly organized. Vicq d'Azyr, whose plan with slight changes was again brought forth by Dr. Guillotin in 1790-91, demanded that the surgeon should have completed his studies at a medical faculty, in other words, that the permission of the barber-surgeon guilds to practise was inadequate. Although he did not achieve his aim, he did hasten the development which brought about the equality of medicine and surgery. During the session of the National Assembly, and almost to the end of the Legislative Assembly that followed, the Faculty continued to vegetate without paying any attention to the new currents.

It was self-evident that the physicians of the Assemblies did not have the support of the Faculty, and that they could not intervene on its behalf. Nevertheless, it is equally understandable that ultimately the entire medical profession was identified

with the Paris Faculty, and that a man like Fourcroy was compelled to inveigh against academic idolatry.

This situation soon reached a point where only the abuses in the medical profession were seen. Dr. Marc Antoine Baudot (died 1836), who in the Convention belonged to the Jacobins, went so far as to declare that he was opposed to every kind of charlatanism and therefore was compelled to abandon a profession whose reputation was due solely to the blindness of mankind (it may be pointed out, however, that he was one of those physicians who, at the time of the Restoration resumed the practice of a profession which they had previously claimed to despise).

The point of view, which desires to transmit the odium of charlatanism to the medical profession, or which sees it as a privileged aristocratic profession, appears again and again during this contradictory period. Dr. François Bousquet (died 1829),



A view of the Convention hall, the former theater of the Tuilleries; on May 20, 1795, in connection with hunger riots the populace forced its way into the hall and held before the president the head of a murdered deputy. Contemporary engraving by Jean Duplessis-Berteaux (1747-1813).

an otherwise rather obscure physician, who had been sick and on leave, said on his return that he was overwhelmed with joy to return to the Convention and to breathe again the air of the "Mountain" (the party of the Mountain). He took this opportunity to loose a blast against the medical officers; they and the doctors are charlatans, he emphasized, even though, as he added ironically, he himself had the honor of being a member of the Faculty. This attitude is typical of many physicians in the extremist Jacobin party. One feared to belong to a group that would appear to the people as aristocratic and therefore suspicious. For this reason many physicians renounced their profession.

When, in 1794, Lavoisier, the great chemist, died under the guillotine, Dr. Choffinhal, a former physician, asserted that the Revolution needs no scientists. Even a man like Dr. Guillemardet, the son of a surgeon, who, in the Convention worked for a reform of the medical system, was imbued with the idea that the "medical aristocracy" had to be destroyed and that the former physicians had only "made themselves ridiculous." Guillemardet also belonged to that group of physicians who achieved a successful career in politics and no longer returned to the medical profession.

Physicians had become accustomed to the idea of a change in occupation even before the Revolution; in time of economic depression it often happened that physicians were compelled to earn a livelihood in various other occupations. Dr. Jean Baptiste Jérôme Bô (1753-1811), one of the most radical members of the Mountain, was a surgeon and apothecary, as was customary at the time, but in addition he was also a wine merchant. Another physician, Loyseau, who was not prominent in any way, was also an innkeeper.

Thus it is comprehensible that numerous physicians in the revolutionary assemblies were no longer aware of their medical aims, and without hesitation exchanged the doctor's hat for the Jacobin cap. Only



The physician Ferdinand Pierre Guillemardet (1765-1810 or 1815) as ambassador to Spain. Portrait by Francisco Goya (1746-1828).

very few, like Guillotin, did not renounce their profession, and in the Assembly raised their voice in favor of sanitary and hygienic measures. At any rate, a number of physicians who turned to politics never abandoned their original profession completely, and in the following we shall show to what extent they were of significance for medical science and public health.

The Physicians of the Constituent Assembly

The first of the revolutionary assemblies, the National Assembly, which after the oath in the *Jeu de Paumes* (Tennis Court) became the Constituent Assembly, saw itself faced by two tasks. It had to carry out the liquidation of the old régime (*ancien régime*) and at the same time to construct the new France. The Declaration of the

Rights of Man issued by the Constituent Assembly abolished the privileges. The paragraphs dealing with the freedom and equality of the individual, and with the sovereignty of the nation and the law formed the pillars upon which the constitution prepared by the Constituent Assembly was intended to rest.

In this assembly counter-currents were already noticeable; the moderates were opposed by more radical deputies who saw in the creation of the Constitution only the first step to a complete revolution. Among the physicians in the Constituent Assembly there were various political tendencies, but striking contrasts are not yet evident. Furthermore, from a numerical point of view the 17 physicians who belonged to this Assembly, hardly stood out among the 600 deputies of the Third Estate.

In the Constituent Assembly the physicians attempted to reconstruct the medical system just as the other deputies were rebuilding the political structure of the state. Two proposals for reorganization put forth by Gallot and Guillotin (1790 and 1791), served as a basis for all later reforms.

Jean Gabriel Gallot (1743-1794), son of a physician, had graduated in Montpellier, and became secretary of the *Comité de*

salubrité demanded by Guillotin. Like Guillotin, he remained first and foremost a physician, even while he was a deputy. Before the Revolution, Gallot had occupied himself with studies on caesarian section and improvements in obstetrics, and had published investigations on bilious fever and epidemics. As a member of the Health Commission, in 1790, he laid before the Constituent Assembly a plan for the reorganization of the medical system, as well as a plan for the erection of hospitals in the country. After the adjournment of the Constituent Assembly, Gallot once again turned to medicine. He died during a typhoid epidemic, which he helped to combat until his last moment.

Joseph Ignace Guillotin (1738-1814), demanded in his proposal that practice, teaching, forensic medicine, health police, sanitary services in the cities and country, epidemics and even animal diseases should all be controlled by the Health Commission that he established. Several of Guillotin's proposals strike quite a modern note, for instance, his insistence on the need for the physical training of children, and his suggestion that in the four medical schools which he proposed to establish in various cities, the examinations should be held in French and not, as previously, in Latin. Even more important was his suggestion that successful completion of the final examinations should entitle the student to practise anywhere in France, and thus end the controversy of the Faculties.

François Pierre Blin (1758?-1834), son of a surgeon and physician, was one of the leaders of the Constituent Assembly, and although originally a "moderate," founded the Breton Club, from which the Jacobin Club soon developed. In the Assembly he concerned himself chiefly with political matters and manifested his medical viewpoint only in the advocacy of humanitarian principles — he opposed capital punishment — but after the dissolution of the Constituent Assembly he returned to the medical profession. Like Gallot he was also



The physician Jean Gabriel Gallot (1743-1794), deputy in the National Assembly.

engaged in studying the epidemics which occurred at this period at various places in France.

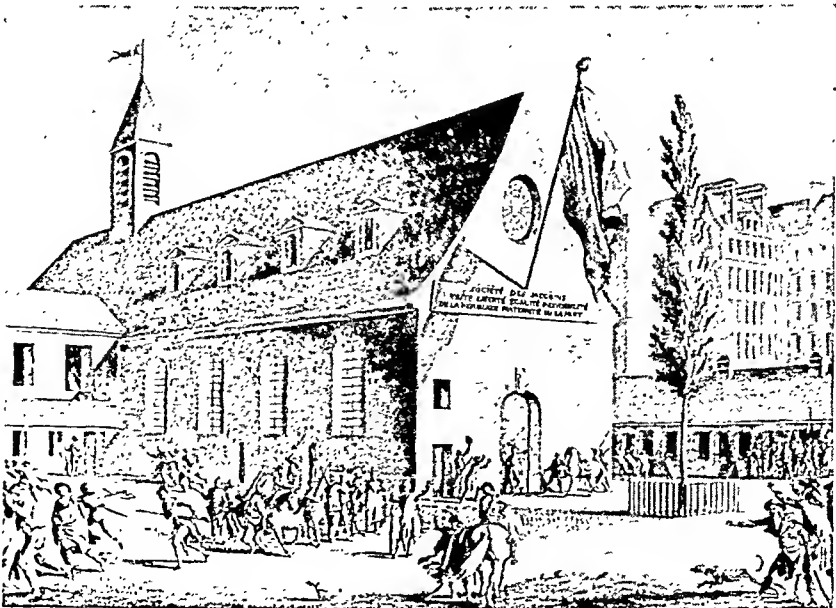
Finally, mention must be made of *Jean Louis Fisson-Jaubert* (born about 1756), author of a book on medical practice. Of the other physicians in the Constituent Assembly, the names of Salle, Beauvais de Préaux and Boussion will appear again in the Convention. The Legislative Assembly contained no members of the Constituent Assembly; in accordance with a proposal by Robespierre, no member of the old Assembly was to be elected to the new one. New energies should work here and build the transformed state on a broader basis. In this way Robespierre hoped to open a path for the entry of the more radical, less conciliatory, elements.

The Physicians of the Legislative Assembly

The Legislative Assembly was imbued with a new spirit. The Constituent Assembly had had experienced, mature men in its ranks. In the Legislative Assembly, however, almost one-tenth of the deputies

were under 16 years, and of the rest only a few were more than 30. From the beginning the parties were sharply differentiated. The party of the Right, the Feuillants, played hardly any part from the beginning. On the left sat the Girondists, so called because many of their members came from the Gironde. They followed a moderate policy and based it on the support of the provinces. On the extreme left was the party of the Mountain, the Jacobins.

Among the 745 deputies were 27 physicians; the number of lawyers (400) exerted a far greater influence. This was also in accord with the legal character of the Assembly, which exercised the legislative power. In the opinion of the historian Michelet the Legislative Assembly should actually be known as the "War Assembly" because it was convoked under the immediate influence of the threatening danger from internal and external foes. In place of the ideals of humanity and the fraternization of nations, which had prevailed in the National Assembly, there was distrust of the King, the non-juring clergy, and the intriguing émigrés. War threatened from



The closing of the Jacobin Club in July, 1794. Contemporary engraving.

without, and inside the country the opposition between the moderates and the radicals became more and more acute. Existing institutions had to fall victims of the intensified feeling of opposition to everything connected with the past. In August, 1792, the Legislative Assembly proclaimed the abolition of all "privileged associations." In this way the freedom of occupation proclaimed by the Revolution was to be secured. In addition to the guilds, this decision affected the universities, faculties, academies, and learned societies.

It appears remarkable that even the moderates among the physicians did not protest against this decree. No one mourned the ossified Paris Faculty. They would have liked to retain the Academy of Surgery and the learned societies, but even here the physicians did not object. All were aware of how great the necessity for reforms had become.

This decree immediately caused complete chaos in the health system. With the abolition of the teaching institutions and the disappearance of examinations, the quacks were given a free field. Now they could, without hindrance, enter the practice of medicine, and be surgeons or apothecaries as they desired. The fact that even the physicians had not warned the Assembly against the easily predictable effects of the decree shows that among them, too, the more radical elements had gained ground.

Among the moderates were two personalities of importance in the history of medicine: Tenon and Gastellier. The famous surgeon and oculist, *Jacques René Tenon* (1724-1816), was a pioneer with his ophthalmic operations, and is known for his studies of the capsula bulbi, which is named after him. A hospital in Paris bears his name today, in tribute to his reorganization of the French hospital system. René George Gastellier (1741[?]-1821) did not play a prominent political rôle. In the field of science he was so addicted to polemics that his contemporaries called him



Georges Danton (1759-1794). Portrait by Madame Charpentier. Carnavalet Museum, Paris.

"Guy Patin redivivus." His memoir on miliary fever during the puerperium, and his claim that there was no puerperal fever *sui generis* brought him to the attention of the medical world. His moderate political views almost brought him to the guillotine; and he was saved only by the fall of Robespierre.

The Physicians in the Convention

The Convention, the most radical of all the revolutionary assemblies, decreed the abolition of the monarchy and proclaimed the Republic. The fact that it was composed of opposed elements renders comprehensible the mood of antagonism and irritation which was present from the beginning. The Girondists, who looked for support to the provinces, incited a revolt of the provinces against the capital. The Jacobins found their support in the Paris Commune and under the leadership of Danton and Robespierre seized power. Through the establishment of a committee to save the state (*comité de salut public*)

and an extraordinary revolutionary tribunal, they attempted to deal with the dangers of foreign foes, and internal anarchy and civil war. The period of the Terror began, and ended only with the fall of Robespierre.

In the Convention composed of such opposed elements and numbering 749 deputies, there were 49 physicians. The attitude of these physicians to the most serious and difficult matter with which the Convention had to deal, namely, the judgment of the King, is especially noteworthy. On the memorable 20 January 1793, when the fate of the King, accused of conspiring with the enemy was decided, of the 39 physicians who were present, 22 voted for his execution, and only 17 were in favor of banishing or imprisoning him. That the physicians were especially inexorable is shown by the fact that of the 721 deputies who came to the session, only 361 voted for execution, so that there was a majority of only one vote. It is sometimes asserted that the physicians like almost all the deputies were influenced by the passionate speeches to vote in a sense that did not correspond to their true convictions. One of the moderate deputies of the Convention, the physician, J. B. Salle (1760-1792), who was guillotined as a Girondist, stated that the deliberations of the assembly were always conducted "in the shadow of the knife." (It may be noted that Salle was the author of a Charlotte Corday tragedy.) Even the most convinced Jacobins among the physicians later admitted that the circumstances under which they acted, and the danger that threatened each one of them influenced their decisions.

Antoine François Fourcroy (1755-1809), a Jacobin, very likely did not join this party, which had become the most powerful in the Convention, for political reasons. He was basically concerned with obtaining the support of the Jacobins for important reforms in the medical system. At this time the party was no longer as hostile to the sciences as it had been at the beginning of

the Revolution. The party was opposed only to the restriction of education for the benefit of a few privileged persons. Everyone should be able to acquire a certain degree of education; indeed, even the introduction of compulsory school attendance was considered (this was first realized in France in 1833). Even more emphatically than his predecessors, Fourcroy demanded the introduction of clinical teaching. For this purpose the large Paris hospital, Hôtel-Dieu, which was known as "Humanité" during the revolutionary period, should be directly connected with the medical school.

Fourcroy's efforts were successful. In December, 1793, three medical schools were established, at Paris, Montpellier and Strassburg. At the end of the year lectures were also started at the school of surgery which was established upon the ruins of the old academy of surgery.

In his medical thinking, Fourcroy, who also enjoyed a considerable reputation as



The physician and chemist Antoine François Fourcroy (1755-1809) who, in the Convention, advocated the reorganization of medical education. Lithograph.



The physician Louis Vitet (1736-1809), deputy to the Convention, who, as a Girondist, was compelled to flee to Switzerland.

a chemist, took as his point of departure scientific facts, as evidenced by his work *La médecine éclairée par les sciences physiques*. In addition to investigations on mineral springs and urinary calculi, Fourcroy also occupied himself with studies on blood, semen, and urine. In 1779 he prepared pure urea for the first time (it had been described by Guillaume François Rouelle in 1773).

Still another outstanding physician, René Levasseur (1747-1834), belonged to the Jacobin party. Before the Revolution he had been an obstetrician and consequently advocated better training for midwives. He later became a zealous advocate of symphysectomy. In the Convention he took part in a debate on the question of the legal interval, within which a child could still be declared legitimate. He took the view that a period of 10 days must be allowed in addition to the nine months.

Several other physicians in the Jacobin party of the Convention were prominent as political spokesmen. In addition to Marat, there were Marc Antoine Baudot, Jean Baptiste Jérôme Bô, Taillefer, Duhem, Beauvais de Préaux. Of these, Charles Nicolas Beauvais de Préaux (1745-1794), who died in consequence of his imprisonment by the Royalists, became practically a "patron saint" of the Revolution. His body was cremated with great ceremony at Montpellier, the urn containing his ashes was sent to the National Archives at Paris, and a bust of him was placed in the Convention, an honor granted only to very few "martyrs" of the Revolution, such as Marat and Chalier.

Georges Taillefer (1762-1819) and Pierre Josef Duhem (1760-1807) appeared before the Convention as physicians only on one occasion, when they advocated eugenic principles, an event which is quite remarkable for that period. In a debate over a proposal to lower the age for marriage, they insisted that the lowest age for women should be 14 years, and 18 years for men. It is more important, they insisted, to consider the interests of the human race as a whole than to permit unrestricted personal freedom. Another physician, Louis Vitet (1736-1809), a moderate, fled to Switzerland during the Girondist persecutions and composed a number of medical works there, which were published during the Consulate. His *Médecin du peuple* represents an attempt, in accord with the new ideas, to write a popular book on medicine.

A reorganization of the medical system did not take place until after the closure of the Convention, at the time of the Directory. The physician, Jean François Baraillon (1742/43-1816), a member of the Council of Five Hundred, which consisted in large part of former members of the Convention, demanded close supervision of medical teaching and after 1797 achieved the re-introduction of formal examinations.

THE PHYSICIANS AND THE MEDICAL SERVICE OF THE REVOLUTIONARY ARMIES

DR. A. G. CHEVALIER

THE war waged by Revolutionary France against Austria and Prussia after April, and against the coalition of these two powers with England, the other states of the Holy Roman Empire, Russia, Holland, Spain, Sardinia, and Naples after February, 1793, may be traced to a great variety of causes. At first it appeared as a purely defensive war, but the victorious advances of the French troops after the early defeats soon gave the struggle added significance; the opportunity had come for France to spread the revolutionary doctrines beyond its borders and to seek new adherents in foreign countries.

The revolutionary movement which in the course of the war was led to organize 14 armies, had to create them from top to bottom. The old professional soldiers of

the monarchy had in large part lost their leaders either through death or emigration, so that everything, including the medical service, had to be organized anew. The military hospitals that had been relatively well organized under Louis XIV had been broken up in 1772 because of a desire to reorganize them. The medical personnel had been dismissed — a procedure which is characteristic of the 18th century, when it was considered preferable to discard completely anything already present before proceeding to the creation of something new. Thus at the outbreak of the Revolution the medical service was in a state of complete chaos, which was not removed by the organization in 1790 of a medical service consisting of about 4000 men — including physicians, surgeons, and apothecaries:



Soldier of the Revolutionary Army treated by medical officer. Colored engraving, 1793.



Scene in a military hospital during the revolutionary wars. Colored engraving, 1793.

The situation became critical when in April, 1792, the Legislative Assembly compelled the King to declare war on Austria. The lack of an organization became even more dangerous when, after the execution of the King, France saw itself threatened on all sides by its allied enemies.

The rapidly assembled armies lacked food and clothing. The medical service which was organized with the greatest speed likewise lacked the most necessary things. The few physicians and surgeons who were assigned to each army complained of the lack of bandages, medications, and beds. The rapid troop movement made it impossible for the cumbersome field hospitals to follow the soldiers. The wounded who generally had to be transported back over poor roads to the hospitals situated far in the rear, frequently died during the journey.

The epidemics that appeared everywhere created great alarm. In his memoirs Desgenettes relates that in 1793, near the Army of Italy, heaps of cadavers could not be removed for nine months, so that the neighboring camp was constantly threatened by epidemics. In the Dutch and Italian war theatres, malaria, dysentery, and typhoid prevailed; scabies and venereal diseases were prevalent in all the armies. The degree to which the armies were honeycombed with disease is shown by the fact that in 1794, the Army of the Rhine alone, with a strength of 100,000 men, had 12,000 sick.

Despite all the energy and self-sacrifice of the medical personnel, it was impossible to provide adequate care for these sick soldiers, and in addition, for the wounded. To this were added the abuses in the organization. As early as April, 1792, a report had been presented to the Legislative Assembly, which revealed the faulty administration of the hospitals. Unscrupulous contractors had taken over the direction of the establishments and the supply service; they tried to decrease the rations or provided



EXTRAIT
DU REGISTRE DES ARRÊTÉS
DU COMITÉ DE SALUT PUBLIC
DE LA CONVENTION NATIONALE,

par le Comité de Salut Public
Le 17 Ventôse l'an 4 de la République

Comité de Salut Public Arrêté
que les hôpitaux militaires
de l'armée de la Gironde

Vignette containing martial emblems on a decree of the military section of the Committee of Public Safety.

inferior products. It happened repeatedly that patients who were seriously ill did not receive any stimulating beverages for twenty-four hours. In the field hospitals which were often temporarily established in churches, the situation was even worse. There the wounded lay on the cold flagstones or on a thin layer of straw without any blankets to cover them.

The Convention immediately took steps to remedy the situation. The palaces of emigrés or the buildings of disbanded convents were transformed into hospitals. Communities were required to requisition mattresses and bandages from the citizens. The Convention took rigorous action against the dishonest hospital administrators; the hospitals were placed under state control, the new contractors were made responsible to the authorities for the administration of their accounts and the organization of the hospitals.

Within the revolutionary armies the physicians and surgeons, like the officers and soldiers, were imbued with an intense responsibility and devotion. In contrast to the physicians in the "Assemblies" who played a part as politicians in the history of the Revolution, the physicians with the armies generally remained anonymous heroes. Some fell in battle, others died of epidemic diseases. Nevertheless, there were a number of outstanding physicians in the armies, who deserve special mention in the history of military surgery. *Pierre François Percy* (1754-1825), a student of Antoine Louis (1723-1792), in 1779 was chief surgeon of the Regiment "Flanders and Artois"; in 1792 he became consultant surgeon to the Army of the North, later for the Army of the Rhine and Mosel, and continued with a very successful career. *Dominique Jean Larrey* (1766-1842), a member of a family of well-known surgeons, had studied with Antoine Louis and the prominent surgeon *Pierre Joseph Desault* (1744-1795), and in 1787 had been a surgeon with the royal navy in American waters. In 1792 he was attached to the Army of the Rhine as staff surgeon; several years later he became a teacher at the Military School in Paris and took part with Desgenettes in the Egyptian campaign. To these two outstanding surgeons should be added *Nicolas René Dufriche Desgenettes* (1762-1837). He had received his doctorate at Montpellier. In 1793 he was with the Army of Italy; in 1794 he became chief physician and in this capacity accompanied Napoleon to Egypt.

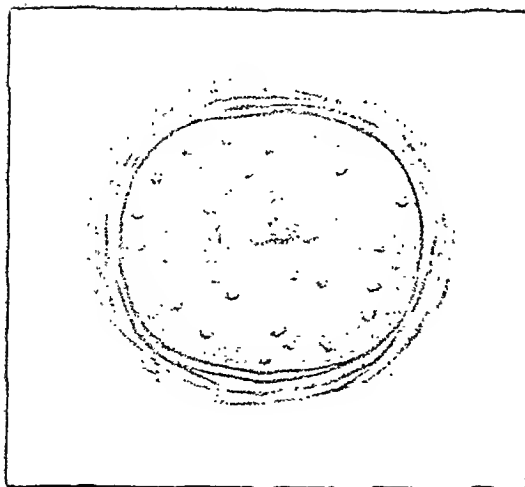
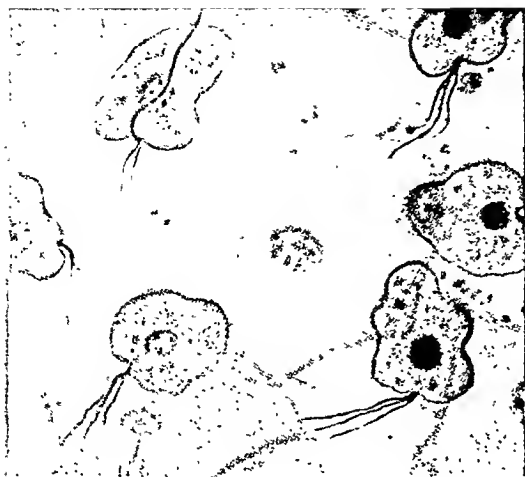
During the first eighteen months of the war the revolutionary armies lost 600 physicians and surgeons on the battlefield. It became necessary to conscript medical men. In 1793 a decree was issued, in accordance with which all civilian physicians, surgeons, medical students, and apothecaries between the ages of 18 and 40 had to place themselves at the disposal of the army. In order to screen the motley group, into which a number of unqualified persons



Nicolas René Dufriche Desgenettes (1762-1837), at the time when he was chief physician of the Army of Italy. Portrait ascribed to *Antoine Gros* (1771-1835). At the right on the block of stone is an inscription reading: "He stills the blood spilled for the fatherland." Carnavalet Museum, Paris.

had managed to slip in, all medical recruits had to take an examination. As this was conducted on the basis of the principle of equality, even physicians who were well known, such as Larrey or Percy, had to take this examination. As a result of these levies the number of medical officers increased from 1400 in 1792 to 9000 in 1794. Nevertheless, many of the younger men, despite having passed the examination, were lacking in practical training and experience. Larrey, in particular, was cognizant of this lack, and to remedy it arranged courses in anatomy and diagnosis at Mainz for the doctors serving with the Army of the Rhine.

The higher medical officers, the chief physicians, chief surgeons, and apothecaries of the first class bore a heavy responsibility. Under the monarchy they had been subordinated to a body of control





DIGIFOLIN

STANDARDIZED BY THE U.S.P. XII



officials, but after 1793 they exercised full authority and were permitted to take action on the battlefield and in hospitals on their own initiative. This independence of the chiefs of the medical service — which, by the way, was not to last very long — had great practical significance for the task of reconstruction, which especially during the first years of the Revolution had to proceed with extraordinary rapidity. Only this circumstance made it possible to create an organized medical corps out of nothing.

Previously the wounded had often been left on the battlefield for hours, and only after the termination of the struggle had it been possible to transport them to a hospital. At times it was hardly possible to move through the throng of wagons, cannon, horses, and soldiers, so that the wounded, if they survived the trip at all, did not reach the central aid station until twenty-four hours later. Larrey who, together with Percy, must be regarded as the reformer of military surgery, saw that immediate steps must be taken to remedy this situation: As early as the end of 1792 he had hit upon the idea of creating so-called "flying field hospitals." At first he organized troops each consisting of three mounted surgeons and an orderly; they were given horses that carried packages of bandage material and litters for the transport of the wounded. In this manner the wounded were to be picked up during the battle and given first aid. As the litters were found to be impractical for the transport of the wounded, Larrey introduced light wagons with good springs, in which the litters were suspended. One side of the wagon could be opened so that a severely wounded man could be placed in it in a horizontal position without having to move him. In order to make certain that bandages would always be at hand, they were placed in side-pockets in the doors of the wagon.

While Larrey created his "flying hospitals," Percy was also concerned with the problem of providing first-aid as rapidly as

possible to the wounded. He organized litter-bearer corps, each consisting of 120 men, whose task was to collect the wounded on the battlefield. Later, in 1798-1799, he had long, box-shaped wagons made which were drawn by eight horses. These wagons, however, were not used for transporting the wounded, but only to bring up instruments and dressing materials. They carried sufficient supplies to care for 1200 wounded. Assigned to these wagons were mounted male nurses, while the surgeons often rode astride the wagon. This arrangement was not maintained very long, because it proved to be too cumbersome under battle conditions.

Not only the ambulance service on the battlefield was reorganized, but the field hospitals as well. Like the combat troops, the hospitals were divided into sections that could be attached to the troop units. Every section was fully equipped not only with bandages, lint, instruments, but also with brandy, vinegar, bread, wine, salt, and bouillon, in order to be able to stimulate and strengthen the wounded. Not only was the revolutionary régime more concerned with the rapid provision of first aid to the wounded and with the welfare of the individual soldier than had previously been the case, but it also extended its care to injured enemies, for they had the same claim to nursing and protection. In order to give visible expression to this human attitude, the buttons on the uniform of the medical officers bore the word "Humanité." General Moreau, the commander of the Army of the Rhine and Moselle, at the suggestion of Percy, proposed to the Austrians that not only the wounded but also the hospitals which would be designated by signs should be treated as neutral and inviolable. Thus the revolutionary army anticipated ideas that were to be realized many years later — 1864 — by the terms of the Geneva Convention.

At this time the treatment of wounds was still based essentially on the experiences of the preceding century. While



The dying Mirabeau is shown giving one of his last works to Talleyrand, the statesman who played such a rôle under the Empire. The man near the screen is probably Dr. Cabanis. Drawing. Carnavalet Museum, Paris.

far-reaching improvements in operative technique and in wound-treatment had been introduced during the 18th century, yet these cannot be considered as revolutionary. Great value was still placed on healing by second intention. In bayonet wounds, prophylactic incisions were often made to permit the pus to flow freely. Bullets, as well as loose or half-separated pieces of bone were removed surgically. Compresses with surgeon's agaric were used to stop bleeding; less frequent recourse was had to ligation of the bleeding vessels, which had long been known and was reintroduced by Ambroise Paré in the 16th century. Claude Antoine Lombard (1741-1811[?]), a surgeon of this period, whom Percy met in the Army of the Rhine and to whom he was indebted for information, already used a tourniquet on limbs to prevent fatal hemorrhage. Ointments and pomades were less frequently used than they had been; dry lint was generally used for dressings. An important innovation was the use of bandages dipped in water. Lombard had learned of their effectiveness by

accident, an Alsatian miller having successfully treated, by means of bandages dipped in water and alum, wounded cannonneers whose hands were to be amputated. Thereupon Lombard, and after him Percy, began to use wet dressings. Larrey, on the other hand, used lint dressings that had been dipped in hot wine to which camphor had been added. In gunshot wounds of the head, he was one of the first to make a counter-opening instead of extracting the missile through the wound canal. The technique of amputation was also improved.

During 1795-6 the position of the military physicians changed completely. A decree abolished their independence and subordinated them to military commissars equipped with unlimited power. This change went so far that the doctors who, for a few years had enjoyed equality of rank with the higher officers, were placed on a level with the service personnel, bakers, and butchers. In 1798-99 at the order of the minister of war their pay was sharply cut. Percy protested vigorously but in vain against this wrong.

MEDICAL OPINIONS ON THE REIGN OF TERROR

DR. A. G. CHEVALIER

IN THE eyes of later observers, the people who lived during the exciting period of a revolution always appear to have been close to madness. Thus the French Revolution in its manifestations of unlicensed passion, when compared with periods that developed more calmly, appears to present to posterity a picture of human abnormality. To judge from numerous passages in their writings, this was the opinion of the great French historians, Jules Michelet (1798-1874), who remarked on occasion that the history of the pathology of the Convention was still to be written, and Hippolyte Taine (1828-1893), who regarded most of the prominent personalities of the Revolution as morally deficient or mentally ill.

Even today some historians of the Revolution base their judgment of Danton's psychology on the statements of the physician Joseph Souberbielle (1754-1846), a friend of Robespierre. According to him Danton is supposed to have suffered from "brain congestion," and during such attacks was unaware of what he said or did. Marat's chronic headaches are also frequently cited as symptoms of a malady which is supposed to have impaired his mind. Taine says outright that he suffered from a persecution mania. In a doctoral dissertation published in 1929 by Jacques Duhamel, the author attempts to trace all the events, meetings, even the public proclamations of the Revolution to the predominance of paranoid elements. Duhamel, who regards Saint-Just, Robespierre and Marat as the chief representatives of the paranoid, anti-social, pathologically egoistic, vain type, and claims to be able to demonstrate an hypertrophy of the ego in other revolutionaries, considers the "Declaration of the Rights of Man," and even

the idea that man is good, as products of paranoid brains. In any case, he believed that many excesses of the revolutionary period can be regarded as defensive measures. This thesis is apparently confirmed by the statement of the physician, Dr. Marc Antoine Baudot, one of the most extreme Jacobins in the Convention, who, when the period of the Terror was already a thing of the past, remarked: "We do not know who is responsible for our acts. We obeyed, with disastrous consequences, the necessity to kill, in order not to be killed." Despite this admission, however, it cannot be assumed that the instinct of self-preservation was the chief motivating factor in the behavior of the revolutionaries. The people, who had freed themselves of their oppressors, had developed a pathological desire for revenge, and this may have been one of the reasons for the behavior of the masses. Thus, for example, the 77-year-old Minister of Finance, Foulon, who is reputed to have said that the peasants should eat grass when they were hungry, was seized by an angry mob of peasants, summarily tried, and hanged by a builder's laborer and a green grocer on a lamp-bracket outside the Town Hall.

Besides the intensification of the idea of revenge, it is possible to identify still another and far more serious motivating factor which the physicians, Augustin Cabanès (1862-1928), and L. Nass, who were less prejudiced than Duhamel, have described as "revolutionary neurosis." It was, they explain, a kind of epidemic of fear, a "contagion de peur," which seized the masses and led to sadistic excesses, such as the murder of Launay, the governor of the Bastille, the dismemberment of the Princess Lamballe, or the frightful September massacres. Among such atroci-

ties may also be included the story that Mademoiselle de Sombreuil was forced to drink a glass of aristocratic blood to save the life of her aged father. It should be pointed out, however, that a number of writers believe that she was forced to drink as a toast to the welfare of the Republic a glass of red wine, handed to her by blood-stained hands.

The more prudent personalities did not dare to intervene against such atrocities, and often they were even carried along. The writer, Restif de la Bretonne (1734-1806) who, in his *Parisian Nights*, attempts to trace the psychological motivations that led to the murder of the Finance Minister Foullon, writes: "Fear of the roaring fury, which the frenzied mob hurls at him, stifles every feeling of pity." According to Cabanès and Nass, another factor may have intensified the epidemic of fear. The freedom which had been so rapidly acquired could not but frighten and confuse the new leading social class, the Third

Estate. Its future was uncertain, and particularly this fear of the unknown which the reaction to the sudden upheaval only intensified, developed into panic. The vandalism, with which the masses dragged the corpses of the kings from the cemetery of St. Denis and through the streets, was a product of the same causes. Iconoclastic acts may be produced by any sudden emotional upheaval; the same people who tore the equestrian statues of kings from their pedestals, smashed the busts of their former heroes, Châlier and Marat, after the fall of Robespierre.

Less strange and frightening than the psychosis of the masses in the streets was the influence exerted on that amorphous mass of popular representatives, the so-called "Plain" in the legislative Assembly and the Convention, a group which today would be described as the moderate center. The "Plain," whose members were derisively described by the Jacobin physician, Duhem, as "marsh toads," because of their



Mademoiselle de Sombreuil is forced by the executioner to drink a glass of aristocratic blood, in order to save the life of her aged father. Picture by unknown painter. Carnavalet Museum, Paris.



Dismemberment of the body of Princess Lamballe, a victim of the massacres in September, 1792. Contemporary portrayal. Holland.

inactivity, always sided with the stronger. The fear with which the deputies were often imbued and especially the wild demonstrations from the visitors' gallery were enough to drive them to the most radical measures. Robespierre, who was well aware of the suggestibility of this mass, appealed predominantly to the "Plain," in the case of all important measures.

No less peculiar than the pathologically intensified excitement of the masses looking for victims is the psychological attitude of the victims themselves, who went to the guillotine in an almost masochistic manner. This readiness to die is by no means to be equated with heroism — it is likewise something abnormal and is based on mass suggestion such as is possible only in times that are completely out of joint.

It is of interest to look at the situation with regard to mental illness at this time. Duhamel claims that particularly during the revolutionary period the institutions for the mentally ill were not full. It is certain that such a period is favorable to the actions of visionaries and mystics, and many ordinary individuals turned to a vague mysticism. The new ideas of the 18th century according to which human reason was supposed to be all powerful, and the worship of nature was to replace

the Christian faith, could not satisfy the phantasy of the masses. The result was fanaticism and extravagant sectarianism. Robespierre was in part responsible for these religious aberrations; the revolutionary festivals which he substituted for the Christian holidays, and the worship of the Supreme Being which he introduced, could not but lead to confusion. Furthermore, Catherine Théot, who is always mentioned in connection with Robespierre and who carried on an extravagant Robespierre cult, had long been a victim of religious mania, and in 1779 had already been incarcerated in the Bastille because she claimed to be the mother of God. Another figure of this period, Théroique de Mérencourt, was at first only a passionate apostle of the Revolution; it was not until later that she became incurably insane, probably as a result of a luetic infec-



The day after the storming of the Bastille the populace vented its anger on the corpse of Foulon, the finance minister. Drawing by an unknown artist. Carnavalet Museum, Paris.



The murderous mob massacring 45 women imprisoned in the Salpêtrière. Engraving from the weekly, *LES RÉVOLUTIONS DE PARIS*, issued by Louis Marie Prudhomme (1752-1830).

tion. These two persons are often mentioned as evidence for the pathological basis of the Revolution. From these instances, however, one must be careful not to draw far-reaching conclusions.

Two French physicians of our time, Laignel-Lavastine and Jean Vinchon, have made detailed studies of the investigations of the mentally ill during the revolutionary period which a contemporary and eye-witness of the Revolution, the physician Philippe Pinel (1755-1826), reported in his book, *Traité . . . sur l'aliénation mentale . . .* (1801). According to Pinel, of 113 mentally ill patients during the years 1794-1795, only 20 had become deranged as a result of the Revolution. In contrast to Duhamel, Laignel-Lavastine came to the conclusion that a revolution causes an upheaval in the psychological state of the masses and thus tends to a disintegration of morality, but only in the rarest cases does it lead to mental derangement. Furthermore, the entire 18th century was especially prone to nervous disorders, and physicians of the period had already attributed this increased nervousness to a more

intense intellectual activity, to an excessive consumption of such newly introduced beverages, such as coffee, tea, and chocolate, and to a sedentary mode of life.

In his great work, *On Mental Disturbance*, which is not confined to the revolutionary years, Pinel does not express any final judgment on the pathological element in the French Revolution. He does say of the years 1793-1794 that no epoch could be better suited for the investigation of mental disturbances than "the great storms of the Revolution which were always capable of transforming passing into flaming deeds, or to develop madness in all its forms." Notably enough, however, the table of patients in the Bicêtre Hospital which he presents, by no means supports this view. In 1788 he lists 151 patients and in 1793 only 71. His pupil, Jean Etienne Dominique Esquirol (1772-1840), goes further than Pinel. For Esquirol, who does not regard the revolutionary period objectively, all political fanaticism is a form of mental disease. He does admit that genuine madness appeared with relative infrequency during the Revolution.

MARAT THE PHYSICIAN

DR. A. G. CHEVALIER

ONLY rarely do the biographers of the people's tribune of the Terror mention that he was a physician. Marat the politician always overshadows Marat the doctor whom the upheavals of his time tore out of his original career. In another period Marat would have developed into a great physician and scientist; he was potentially well qualified for such a career.

Although Marat the politician is as passionately admired or hated today as he was during his own lifetime, an attempt will be made here to present a picture of Marat the physician without taking any stand with regard to his political views.

Jean Paul Marat (actually Mara) was born on May 24, 1743, at Boudry in the then Prussian Neuchâtel as the son of a Sardinian and the Genevese, Louise Cabrol. As a boy he was already hot-tempered, and probably because of his ugliness suffered from depressive states which he later tried to compensate by arrogant behavior. He was imbued with a thirst for knowledge and at an early age was already a passionate advocate of the ideas of Rousseau and Montesquieu. It is not known with certainty whether Marat on his arrival in France in 1759 had already engaged in medical studies. One of his biographers asserts that he began to study medicine at Toulouse, but his presence in this city has not been proven. At the age of 16 he became a tutor at Bordeaux in the home of Paul Nairac, later a royalist deputy of the Estates General.

Why he gave up this position at Bordeaux remained unexplained like so many other things in Marat's life. His endeavor to educate himself further, and a desire to see other countries and to become acquainted with other systems of government may have determined Marat's action.



Jean Paul Marat (1743-1793). Originally a physician, later a revolutionary leader. Portrait painted by Joseph Boze in April, 1793, a few months before Marat's murder. Caranalet Museum, Paris.

Likewise, the first period of residence in Paris is shrouded in obscurity. At this time he was probably already deeply interested in astronomy and physics. In 1761 when the famous astronomer Jean Chappe d'Anteroche (1722-1769), was commissioned to make observations in Siberia on the transit of Venus, Marat tried to join the expedition. His petition was denied, however, by Louis XV. Marat's fate, to be rejected again and again, probably revealed itself here for the first time. He wanted to establish close contact with the Encyclopedists, but here too his difficult, strange nature found no understanding. He buried himself in the most diverse labors, began to write a love novel, *The Adventures of the Young Count Potowski*, of which he was later ashamed and which he never wanted

to publish; but at the same time he began to work on the *Chains of Slavery* in which the future politician is already evident.

In 1765 or 1769 Marat came to England by way of Holland, and there he extended his medical knowledge. Repeatedly the legend appears that he was only a veterinary in England or that he was a charlatan. At present it is incontestably established, however, that Marat acquired his doctorate from the Scottish university of St. Andrews, and that the rumor of a jail sentence which he received at this time because of the theft of a coin from the Oxford Museum is untrue. On the contrary, it was in England that Marat for the first time obtained recognition. Here he published his first works in English, the *Essay on the Human Soul* (1772), an expanded edition of this work, the *Essay on Man* (1773), his political confession, *Chains of Slavery* (1774), which no bookseller dared to sell, and two medical treatises.

As a motto for all of Marat's medical writings one may take the sentence which he wrote in 1783 in his *Mémoire sur l'électricité médicale*: "On ne trouvera dans cet ouvrage aucune hypothèse, aucune observation inexacte, aucune expérience incertaine, aucun principe douteux, aucune conséquence hasardée; c'est des faits seuls, mais des faits simples et constans, que tous mes raisonnements sont déduits." There is no better characterization of Marat's scientific point of view. Again and again he takes as his point of departure three fundamental groups of facts: his anatomical knowledge, the laws of physics, and practical experience at the sickbed. At a time when the Medical Faculty of Paris carried out only two dissections annually, Marat, who returned to Paris from England in 1776, untiringly dissected human and animal cadavers, and even performed vivisections in order to obtain a more profound knowledge of the secrets of the organism. As he had already pointed out in his physiological *Essay on Man*, his physical studies led him to regard the human body as a

kind of hydraulic machine driven by the circulatory system. Upon ligating nerves he discovered that all parts distal to the point of ligation became insensitive. He observed that blows on the head could produce vomiting, and concluded, therefore, that all the nerves were dependent on a center, the meninges, which, in accordance with the spirit of the age, he called the "seat of the soul."

Marat always kept strictly to the details of the individual case. In his writings he presents the case histories, the therapy employed and the results obtained in precise detail, only then does he draw general conclusions. Furthermore, Marat was one of the first physicians who, in presenting a case history, replaced the name of the patient by his initials. Discretion, he emphasizes, is obligatory on the physician, and Marat deserves credit for insisting on general recognition of professional secrecy in medicine.

Marat's therapy was based on a graduated administration of medicaments, because he was of the opinion that various stages in the healing process must be treated differently. As a result of similar considerations he arrived at a purely local treatment in certain cases. Thus, in his first medical work, *Essay on Gleet*s (published in England in 1773), an essay on gonorrhea, he indicates his method of local treatment. He employed a method similar to that of the French physician, Jacques Daran (1701-1784), who recommended the use of bougies for urethral strictures. In contrast to Daran, however, Marat insisted that only the diseased areas should be treated. Consequently, he did not cover his bougies — which were much more elastic than those previously employed because of the addition of turpentine and marsh mallow — completely with a pus-dissolving mixture as Daran had done, but covered only those portions which when the bougie was introduced into the urethra would come into contact with the affected areas. Furthermore, he gradually decreased the



Marat acquitted of the charges brought against him by the Girondists, is carried off triumphantly by the people. Contemporary broadsheet.

strength of the applied mixture (litharge, olive oil, yellow wax, Venetian turpentine, Armenian bolus, and balsam of Peru), and took into account the constitution of the patient; during the treatment phlegmatic or plethoric patients received cinchona bark soaked in wine. More modern appear his injections with a solution of ammonium chloride, which have been used again in recent times.

A second work, likewise published in England and entitled, *Inquiry into the nature, cause and cure of a singular disease of the eyes . . .* (1776), shows Marat's methodology in a still clearer light. Here, on the basis of four case histories (a child that had received mercury biscuits against worms, and three men who had been treated with mercury for gonorrhea), he describes a kind of pathological hyperopia

which until then had often been confused with *amaurosis*. Before undertaking the actual treatment, Marat prepares the patient with an almost exclusively dietetic treatment. Then he begins with electrotherapy, which was not, however, completely new as it had already been used by the physicist Louis Jallabert in Geneva in 1749. Marat was probably the first physician, however, who used this type of electrotherapy systematically in a specifically graduated dosage. He began with a weak current which was then gradually increased. The results of this treatment were apparently quite successful.

Marat's *Memoire sur l'électricité médicale*, which appeared in 1784, enables us to see how in the course of a few years he deepened and expanded his electrotherapeutic knowledge. The Academy of

Rouen, which crowned this work with a prize, had set the following problem. "To what extent and under what conditions does the application of magnetism and of positive or negative electricity come into question for the treatment of disease?"

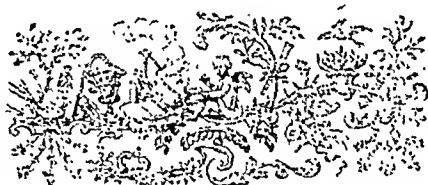
Marat recognized the ineffectiveness of the so-called electrical baths which were so popular at the time, and in which the patient, placed on an isolating plate, was subjected to an electric current. He regarded as equally ineffective the kind of electrotherapy where only the air of a compartment, in which the patient was situated, was charged with electricity. Marat advocated only "electrical friction," sparks, and shocks. Unsuccessful, too, are electrical treatments in cases of illnesses caused by foreign bodies, cases of intoxication, fever, and infectious diseases, and they are actually dangerous in cases of cancer and carbuncles.

Marat recommended electrical friction, where the part of the body to be treated was covered with flannel and the ring of a metal rod with a glass handle was rubbed back and forth over it, as well as spark treatments, in all diseases, where the fluids of the body are inactive, that is, obstruction of cellular tissues, hydropic tumors, scrofula, amaurosis and similar diseases. Marat employed electrical shocks, produced by means of Leyden jars and gradually increased in strength, in diseases whose seat was in the muscular tissues and bones, that is, in rheumatism, sciatica, hemiplegia, paralysis and cases of apparent death.

How Marat treated cases which he excluded from electrotherapy is shown by his description of a very successful cure which in Paris had earned him the title of the "physician of the incurables." This was the case of the Marquise de l'Aubespine, who was afflicted with pulmonary disease and who had been given up as a hopeless case by Dr. Bluvard (1717-1787), a well-known practitioner. In 1776, when she was expectorating large quantities of puru-

lent matter, and was in a serious condition, the Marquise sought help from Marat. At first he prescribed mild purgatives, a sweet emulsion of almonds with saltpeter, but as the chief remedy his "eau factice antipulmonique," which had been investigated in 1778 by Abbé Tessier, a professor at the University of Paris.

Marat's reputation as a physician penetrated more and more into the upper classes of society. Thanks to the influence of the Marquise he became physician to the bodyguard of the Count of Artois, the brother of Louis XVI. Thus it appeared that his medical reputation was firmly established, especially through his position at court. Nevertheless, his character which tended to arouse opposition everywhere, his hatred of mediocrity, his tendency to engage in polemics, and his fanatical search for truth, in short, all the qualities which were later to characterize his politi-



M É M O I R E

- S U R

L'ÉLECTRICITÉ MÉDICALE.

P R O G R A M M E.

Jusqu'à quel point, & à quelles conditions peut-on compter dans le traitement des maladies, sur le Mécanisme & l'Électricité, tant négative que positive ?

LA santé est le premier des biens, le seul sans lequel on ne peut jouir d'aucun autre. Rarement en connoît-on le prix, qu'après l'avoir perdu. En jouit-on ? toujours on fait peu pour le conserver ; souvent beaucoup pour le perdre.

Title page of Marat's MÉMOIRE SUR L'ÉLECTRICITÉ MÉDICALE, 1784. From the first edition.

cal activity, soon made him many enemies. He was always surrounded by an atmosphere of irritability and antagonism. In 1777 his work, *De l'homme* (the translation of his *Essay on Man*) had already found an unrelenting critic in Voltaire. Voltaire, who ridiculed Marat's theory of the meninges as the seat of the soul, actually sought to attack all the advocates of Rousseau's ideas, the opponent of the Encyclopedist Helvétius whom he glorified. "It is amusing to see," he wrote, "a physician citing two novels (Rousseau's *Nouvelle Héloïse* and *Emile*) instead of Boerhaave and Hippocrates. . . . Harlequin is cutting capers to amuse the public."

As in all the polemics in which Marat was involved, the immoderation of this attack is astonishing. Marat himself always replied in the same way; he looked for a fight and was not afraid. He strove for recognition, but after receiving a prize for his work on electrotherapy in Rouen, luck turned against him, and the treatises which he sent to various academies remained unsuccessful. Nevertheless, it was not due to any lack of quality; the Academics were suspicious of a man who had already published subversive writings in England. Some of his biographers arrive at the conclusion that if Marat had obtained recognition from academies and scientists, he would not have become an implacable revolutionary. To be sure, he did seek to revenge himself on the academies for the rejections when, in 1791, he wrote his *Lettres sur le Charlatanisme Académique*, but Marat, the author of the *Chains of Slavery*, would certainly not have been diverted from his path by any honors.

Doubts as to whether he would ever obtain recognition as a scientist, wore down his energy. But when Louis XVI, in 1788, convoked the States-General, Marat received a new impulse to action, like all those who for years recognized the social abuses in France. "This news," he wrote



Marat with the fatal wound—(in contrast to the autopsy report shown here on the left side). Picture by an unknown painter, based on the sketch executed by Louis David (1748-1825) immediately after the assassination. Carnavalet Museum, Paris.

later, "made a tremendous impression on me; I felt a healing crisis, and my courage was revived."

Marat saw the situation clearer than others. He did not believe the arrival of an age of human fraternization; he knew that one could not base any hopes on imposing speeches and promises, but that it was necessary to fight, and he had learned to fight during the preceding years. As a forum for his political ideas he founded his famous paper, which he first called *Le Publicien Parisien*, and which, after a short while received the far more effective title of *L'Ami du Peuple*.

From this point on Marat is no longer a physician and scientist. Indeed, he seems completely to have forgotten the past. He becomes a politician, and a passionate journalist who is concerned with very different things than therapeutic experiences and medical discoveries.

DOCTOR GUILLOTIN

DR. A. G. CHEVALIER

THE name of Joseph Ignace Guillotin is indissolubly linked with the instrument for capital punishment named after him. For decades his biographers have tried to show that the beheading machine has been named after him without justification, and that the great love for humanity felt by one of the most humane physicians of the French Revolution has been misunderstood. Over and over again one finds in histories and encyclopedias the erroneous statement that Guillotin was the "inventor of the guillotine."

Three stages in Guillotin's life distinguish him from the large number of physicians who were active during the Revolution, and throw the bright light of history upon a man who was otherwise very modest and retiring.

Guillotin's activity in the National Assembly was of the greatest significance for his activity. But he also attained prominence on two other occasions; once before the Revolution, when he had to judge mesmerism and advocated clarity of thought and honesty in therapy, and then years later, at the time of the Consulate when he took upon himself the task of smoothing the path from smallpox vaccination.

Aside from these three landmarks in his life, the biographical data concerning Guillotin are not important. He was born in 1738 at Saintes (north of Bordeaux), and after a short period of teaching at the Jesuit high school in Bordeaux turned rather late to medicine. He studied in the Faculty of Paris, and because of the high fees demanded at Paris took his degree at Reims. As the winner of a prize offered by a foundation, however, he also acquired the doctoral title at Paris and was professor in the Faculty from 1778 to 1783.



Dr. Joseph Ignace Guillotin (1738-1814) who disliked the revolutionary costume and wore powdered hair until his death. Carnavalet Museum, Paris.

Guillotin did not enter the National Assembly, the only revolutionary gathering of which he was a member, because he was an active politician. When the King, in 1788, requested all leading personalities to express their opinion on the future composition of the States-General, it was solely his social consciousness which led him to send in a petition. In the same year this composition was adopted and published as the *Petitions des citoyens domiciliés à Paris*. The Third Estate, Guillotin pointed out, was numerically superior to the two upper classes, the nobility and the clergy. If it was desired to act justly, account must also be taken of this fact in the composition of the States-General. Consequently, Guillotin demanded in clear and moderate

language, from the King, to whom he appealed as to the father of a large family, that for each representative of the clergy and for each two of the nobility there should be three representatives of the Third Estate.

A court which was antagonized by this manifesto called Guillotin to account. He defended himself nobly. Even his opponents had to admit that he had been motivated neither by vanity nor a desire for notoriety. From the court-building he was conducted to his home in a triumphal parade of citizens.

At one stroke Guillotin had become popular. He had made the cause of the Third Estate his own. It was as its representative that he was elected to the States-General in 1789, and it was thus that he came to be a member of the National Assembly which developed from the Third Estate.

Already in 1784, when the royal commission to investigate mesmerism was appointed, Guillotin, by his attitude, had demonstrated the firmness of his convictions. Together with the astronomer, Jean Sylvain Bailly (1736-1793), later president of the National Assembly, Benjamin Franklin and Lavoisier, he had proceeded energetically against the adherents of Mesmer and of his doctrine of animal magnetism; for control experiments with the miraculous magnetic tub had led the commission to the conclusion that there was no such thing as a magnetic fluid.

Although Guillotin did not sign the report of the commission, he apparently took part in its composition. Thus, a man who had opposed a false doctrine which counted many adherents among the aristocracy could not but appear suitable to the Third Estate to exercise an enlightening influence in political assemblies. It may be that Guillotin disappointed some people later because he was not a radical. He always limited himself to social and medical purposes, and all the bills that he

proposed dealt with social and hygienic problems. It appears, therefore, to be almost an irony of fate that just this attitude should lead him to suggest a beheading machine, for the use of which during the Reign of Terror he was made responsible during his entire lifetime.

When the executions in Paris seemed to be unending, and the machine operated so rapidly that 21 Girondists were beheaded in 36 minutes, Guillotin recognized with horror how his proposal, which was motivated by humane considerations, had been transformed into its very opposite. He tried to save many unfortunates; but it was in vain that he appealed for mercy to Marat, whom he knew as a fellow practitioner. He lived to hear the name "guillotine" on everyone's lips, to see the picture of the machine in all the shop windows, to see friends wearing replicas as fobs on their watch-chains, to find models placed as ornaments in drawing rooms, and to



Popular representation of the execution machine, which appeared a short time after Guillotin's proposal (1789).



Medallion issued by the Académie de Médecine de Paris, of which Guillotin was a co-founder, with his portrait as he was in 1809.

On the obverse, Hygieia with the cock.

observe miniature guillotines being given to children as gifts. Embittered and disgusted, Guillotin left Paris.

Some biographers assert that on his return to Paris, Guillotin himself almost became a victim of the guillotine, and was saved only by the events of the 9th Thermidor (July 27, 1794), which led to the fall of Robespierre. Actually, however, Guillotin was first arrested in October, 1795, allegedly because of illegal writings, at a time when he was physician to the sick poor of the market district.

Yet he was to be reminded again of the Reign of Terror of the guillotine. In March, 1795, there began a polemic on the question whether execution by the guillotine was actually painless, as was asserted. The well-known anatomist of the University of Mainz, Samuel Thomas Sömmering (1755-1830), believed that he was able to demonstrate sensations of pain in beheaded persons. The same opinion was also maintained by the publicist, C. E. Oelsner, who, in Frankfurt, published a letter addressed to him by Sömmering in which the latter based his argument on the opinions of various colleagues and on that of the scientist and physician, Albrecht von Haller (1708-1777). When the spinal cord is touched, Sömmering declared, the heads of beheaded individuals exhibit frightful grimaces. Since then, however, physiology

has shown that these are reflex movements. At that time, however, another German doctor named Weicart (it was perhaps Melchior Adam Weicart, 1742-1803) went so far as to maintain that when the respiratory apparatus was not separated, the heads of such persons could even open the lips and speak. Allegedly these assertions had been confirmed in Bologna by means of experiments with a galvanic current. The physician, Jean Baptiste Sue (1760-1830), the father of the famous French novelist Eugène Sue, in 1796, also supported this opinion in his *Opinion sur le supplice de la guillotine*. Guillotin, himself, kept aloof from this debate. Gastellier, surgeon at the Hôtel Dieu, in Paris, Jean Baptiste François Lévillé (1769-1829), a number of other physicians and above all the famous Georges Cabanis (1757-1808) reputed the hypothesis as erroneous.

As late as 1812 Guillotin wrote to one of his friends that there were circumstances in his life which made it necessary for him to work incessantly. By this he probably meant that he was trying to forget that Reign of Terror, of which the memory lay so heavily upon him. Perhaps he also considered it a kind of expiation when he used all his efforts to protect life wherever possible. Thus, when Edward Jenner's cowpox vaccination was introduced into France around 1800, Guillotin was one of the first who advocated it.

Guillotin also found a new field of endeavor in the advancement of theoretical medicine. In 1804 he was one of the co-founders of the *Académie de Médecine*, and its direction was later entrusted to him. Aside from a number of dissertations written while he was a student, and a study on gynecological diseases written at the age of 26 but never published, all his writings were composed for very practical purposes. Above all, however, his advocacy of vaccination, and his efforts in the cause of medical reform and reorganization are the best evidence of his humane aims.

HISTORICAL NOTES

THE EXECUTION MACHINE
OF THE REVOLUTION

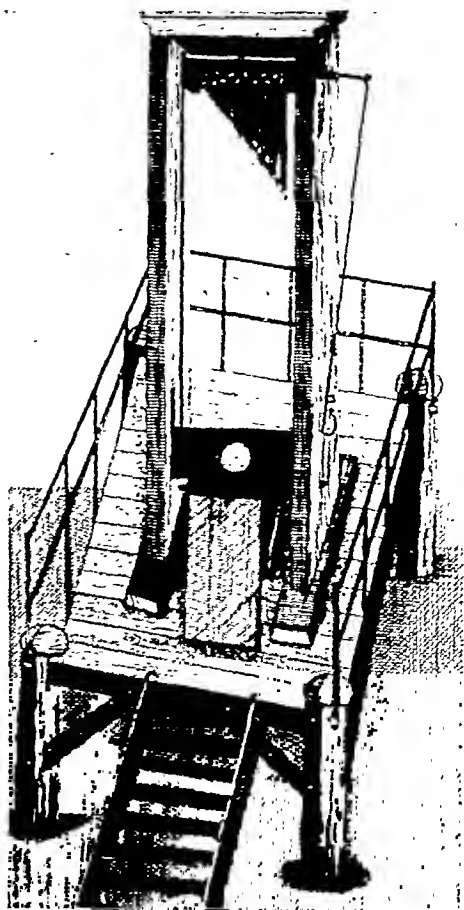
Even before transferring its session to the Tuilleries (October, 1789), the Constituent Assembly had occupied itself with penal reform. On October 10, Dr. Guillotin participated in the debate, and began by pointing out many of the existing evils. For the same crime the punishment should be the same, no matter what the social position of the person involved. As a method of executing all those condemned to death he proposed decapitation by means of a "simple mechanism."

The Assembly, however, adopted only the proposal for equality of punishment and postponed the debate on Guillotin's other plans. It was not until December 1 of the same year that Guillotin again took the floor to urge the Assembly to adopt his other proposals. Unfortunately, his great speech, which the *Gazette de Paris* and the *Moniteur* praised for its humane ideas, has not survived. The *Journal des Etats Généraux* reproduced only the passage which was to become so fateful for his destiny. Guillotin attempted to present a particularly vivid picture of the sufferings of those unfortunates executed with so much ceremony by the executioner. Then he went on to show how much more humane was the use of a beheading machine where the entire procedure lasted only a moment. In the course of this presentation he let himself be carried away by his own oratory, which at the moment was more powerful than the circumspection of the reformer of the penal law. "The blade descends like lightning," he cried out to the Assembly, "the head flies off, the blood spurts, the person lives no more!"

Guillotin who actually uttered these words for humane reasons was to regret them for the rest of his life. The Royalists never forgot this slip. Pamphlets dealing with it were published, and songs ridiculing Guillotin were sung. The antirevolutionary *Journal des Aetes des Apôtres* published the following rhyme which probably led to the use of the name "guillotine" for the beheading machine:

"Guillotin,
Medecin,
Politique
Imagine un beau matin
Que pendre est inhumain
Et peu patriotique.
Et sa main
Fait soudain
La machine
Qui simplement nous tuera
Et que l'on nommera
Guillotine."

And yet the question of introducing this new mode of execution had not even been



The guillotine. Represented by a popular engraver, probably a Hollander; the perspective is quite distorted.

decided. In June, 1791, when it was decided that decapitation was to be used for all cases of capital punishment, the National Assembly was still undecided as to the method. Nevertheless, it did not turn to Guillotin, but instead to the famous surgeon Antoine Louis (1723-1792) who, as a member of the Academy of Surgery and an inventor of numerous instruments, appeared to be a suitable person to decide the matter. In his memorandum, Dr. Louis does not even mention Guillotin's name. He states that all instruments of which the blade is situated at right angles to the direction of fall produced an action like a saw. The machine must, therefore, be constructed so that the edge of the blade is at a diagonal to the direction of fall. As examples he cites certain English machines which, in his opinion, require only a few improvements to provide the necessary certainty, rapidity, and evenness of operation.

After receiving the report of Dr. Louis the Assembly wanted someone to construct the machine designed by the surgeon. It is reported that the German piano-builder, Tobias Schmidt, and the executioner, Sanson, met for their usual evening of chamber music. Sanson, who had just finished playing a piece by Glück on the violin, mentioned this machine in conversation and Schmidt rapidly drew a sketch. Actually, however, Schmidt appears to have built the machine according to the specifications of Louis. It was his intention to obtain a monopoly for all the Departments, but an architect whose job it was to test the machines, maintained that they were inadequate. At the same time he made known the cheaper bid of a carpenter who asked only 500 livres, instead of the 824 livres demanded by Schmidt, and who produced a better product. Thus, when the final contracts were handed out, Schmidt who, in so many books, is mentioned as the builder of the guillotine, was not considered.

The machine was first tested on sheep, then on cadavers. On April 24, 1792, it was used for the first time to execute a murderer. Dr. Louis, who died in May of the same year, did not live to see it used for the first political execution (August 21, 1792). It was suggested that the instrument be called *Louison* or *Petite Louisette* after Antoine Louis, or even *Mirabelle*, after Mirabeau, the great spokesman of the first period of the Revolution,

yet it kept the name Guillotine which had appeared as early as 1789.

Modern research on Guillotin, which has taken all these facts into consideration, takes the view that Guillotin's share in the invention of the guillotine is rather limited. It is not even clear whether Guillotin had in mind the construction proposed by Dr. Louis. In his first speech he had spoken only of a "simple mechanism." In his later remarks Guillotin is supposed to have discussed the details of its construction in greater detail, but the single reporter in the *Journal des Etats Généraux*, who reproduced a portion of the speech, wanted, as he admitted, to spare himself the labor of a long-winded and tedious rendition. Consequently, we have only conjectures on which to fall back. An interesting reproduction of the guillotine is to be found in a popular broadside which was probably circulated soon after Guillotin's proposal (see illustration page 265).

DR. A. G. C.

WAS MIRABEAU POISONED?

Honoré-Gabriel Riquetti, Comte de Mirabeau (born 1749), the famous French statesman died in 1791. During his final illness he wished to have at his bedside only his friend the physician, Georges Cabanis (1757-1808). Immediately after the fall of the Bastille in 1789, Cabanis had become acquainted with Mirabeau. Although he cared for Mirabeau with the greatest devotion, Cabanis was suspected immediately after his death of having given poison to his patient. This rumor was based on several circumstances. Shortly before his death, Mirabeau requested Dr. Cabanis and his other friends to give him opium so that he could pass away painlessly. Cabanis did not grant this request, but instead gave Mirabeau a harmless drink which he said contained opium. Mirabeau drank it and soon died. Furthermore, the physician Vicq d'Azyr, at the autopsy, found the viscera in a particularly poor state; he attributed this to "sharp remedies" that had been used to treat the patient. At present it is believed that the many mercury baths, which Mirabeau took for his venereal infection, were not without influence on his death, and that it was this that Vicq d'Azyr meant.

DR. A. G. C.



**IT'S IN THE
BAG**

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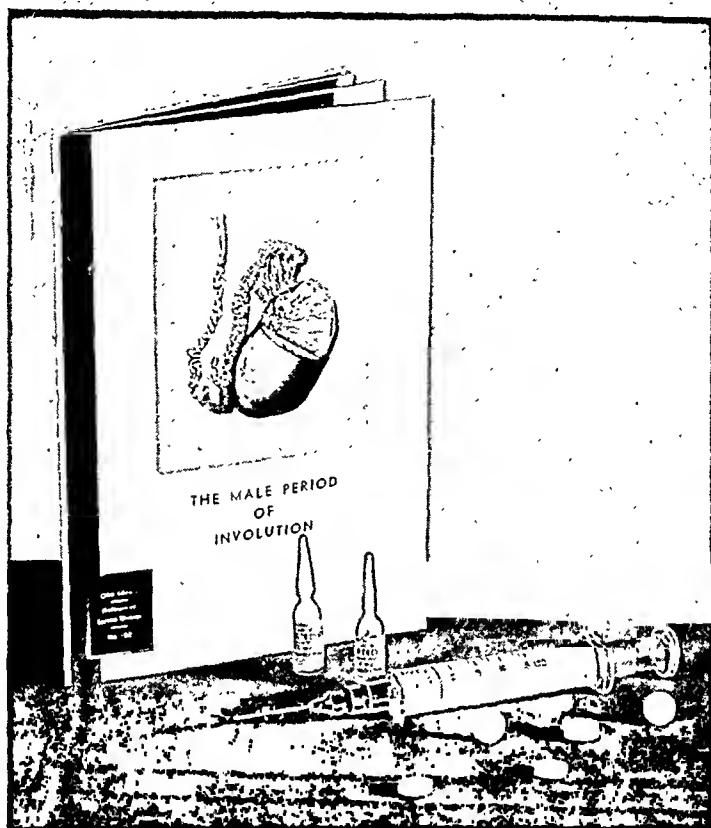
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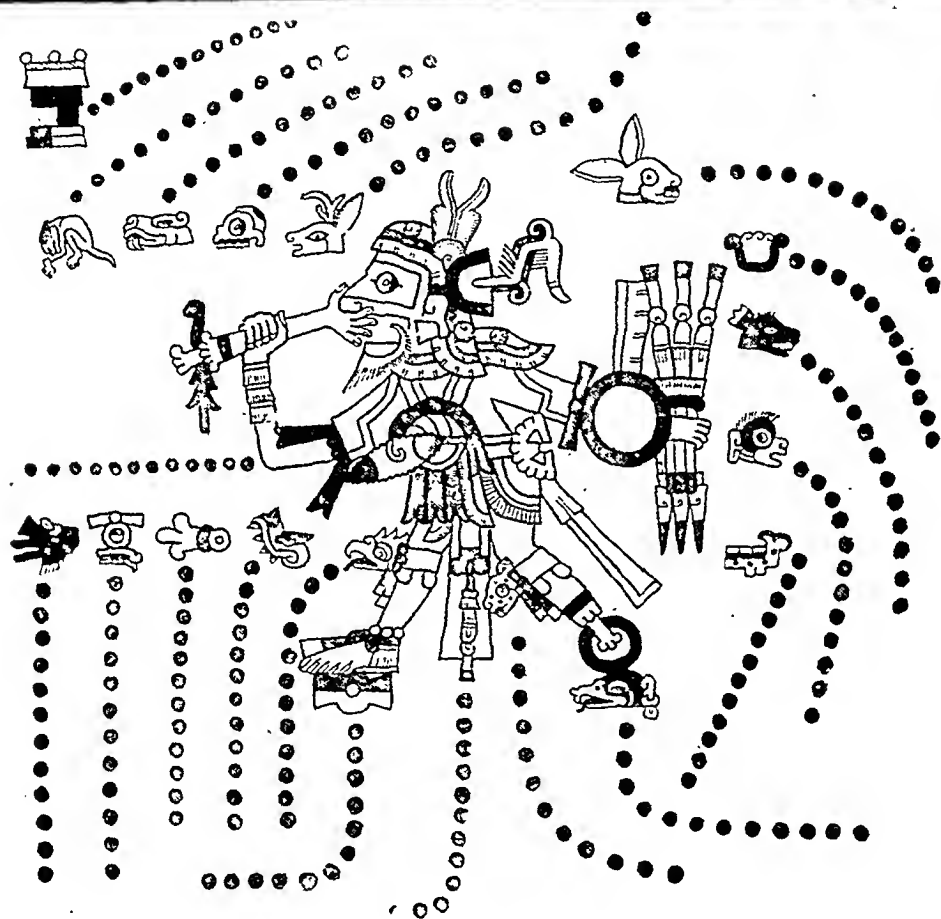
PERANDREN and METANDREN

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Bombay, May 1953

Number 16

Aztec Medicine of Mexico

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Synopsis of Aztec Pre-History and History

Archaeology

- A.D. c. 100–800 Period of *Archaic Cultures* following upon a still unidentified early stage of agriculture (maize). Arts and crafts are already considerably developed. (Strata extending from Early Zacatenco to Late Ticoman.)
- A.D. c. 600–1200 Period of the *early, advanced civilization of Teotihuacan* in the highland Valley of Mexico (strata I–IV); of the later civilizations of Monte Alban IV–Tula–*Xochicalco* (c. 1000–1200); and of *Mazapan–Cholula–Cerro Montoso* (c. 1200–1300). Period of commercial relations with the flourishing *Maya* cities of Guatemala and Yucatan. The people who evolved these civilizations are known only from the semi-mythical reports concerning the “*Toltecs*”. (The dates for the archaeological strata have been taken from Vaillant and Linné.)

History

- A.D. c. 1000 Great upheavals and migrations. End of Toltec domination (1064). Expulsion of the *Olmechs* from Cholula (1168). *Nahua* tribes from the uplands make their appearance in the Maya territory of Yucatan. With their help, the family of the Cocom of *Mayapan* establishes its hegemony among the Maya cities (Late Maya Civilization) in A.D. 1191.
- After 1200 Under their leader Huitzilhuítl, the *Aztecs*, a *Nahua* tribe linguistically related to the Toltecs but more primitive than the latter, after long migrations finally come to a halt at Chapultepec by the shores of the principal lake in the Valley of Mexico, but become subject to the neighbouring cities.
- 1324 Foundation of Tenochtitlan-Mexico, the Aztec city built in the midst of the salt-lake.
- 1375 *Acamapichtli* (till 1396) is elected first king. Period of peaceful growth. Dependence upon the neighbouring city of Azcapotzalco continues also under his successors Huitzilhuítl (till 1427) and Chimalpopoca (till 1427).—Shortly after, the domination by cognate Mexicans of the Maya area comes to an end with the Tutulxiu family in Mani heading the national rising of the Maya cities against Mayapan (1436).
- 1427 Beginning of Aztec independence and military power under King *Itzcoatl* (till 1440; Tlacaélel in command of the army). Power of neighbouring cities broken. Foundation of *triple alliance* with Texcoco and Tlacopan (now Tacuba). This alliance forms the basis for the extension of Aztec military power over the surrounding country as far as Guerrero, Oaxaca, and Vera Cruz, as undertaken by Motecuzoma I (till 1471), the contemporary of the famous poet and law-giver Nezahualcoyotl of Texcoco (1431–72). Motecuzoma's successor, Axayacatl (till 1481) consolidates the newly-won positions which extend to Tehuantepec and beyond. After a temporary set-back under Tizoc (till 1486), the victorious campaigns are continued by Ahuitzotl (till 1502). Only Michoacan and the free state of Tlaxcala maintain their independence.
- 1492–1504 The four voyages of Columbus. Mexico not yet reached.
- 1502–1520 Under Motecuzoma II (Montezuma) constitutional changes are effected which lead to a despotic monarchy.
- 1517–1518 Cordoba and Grijalva explore the coast along the Gulf of Mexico, being the first Spaniards to penetrate to these regions.
- 1519–1521 Hernando Cortés in league with Tlaxcala conquers Mexico. The three allied states of Mexico make way for the colony of New Spain, under a Spanish viceroy.
- Through all the centuries of Spanish colonial administration the Indians continued to form the bulk of the rural population. Since Mexico's declaration of independence, they have played a part in the political life of the country. There have been famous presidents, such as Juárez, who ordered the execution of the emperor Maximilian, and Porfirio Díaz, both of whom were almost pure-bred Indians.

H.D.

Pronunciation of Aztec names. The usual spelling is that adopted by the Spaniards and is followed here in accordance with Vaillant. qu before e or i = k; c before e or i = ss; x = sh; ch = tch; hu or u before a vowel = w. Other vowels as in Spanish or Italian. Thus, Quetzalcoatl is pronounced (roughly) Kayt'-zal-co-atl; Huitzilopochtli, Weet-zeel-o-potch'-tly; Xochipilli, Sho-tchee-pee-ly; and Cihuateotl, See-wah-tay'-otl.

Richly varied and self-contained civilizations flourished in the two Americas long before Columbus set foot on the island of Guanahani (Watling) and took possession of the New World in the name of Their Catholic Majesties of Spain. This ancient American Indian culture embraced the whole gamut of social structure and forms from the primitive hunter to the hypercivilized dweller in great cities. But since that fateful time when European conquest sounded the death-knell of the old order, only a few scattered remnants have survived comparatively untouched, both in the north and in the south. Today, the world is familiar with the high achievements of pre-Columbian American civilization in the mountainous regions of the west; there is much talk of

Incas, Aztecs, and Toltecs, and a growing enthusiasm for the mysterious Mayas.

The Quichua and Aymara of Peru and their reigning family, the "Incas", do not concern us here. We shall confine our attention to the northern regions of Central America. The high plateau of Central Mexico with its big expanses of barren plain, shut off to the south by a ridge of volcanic mountains, was controlled by the Nahua tribes, to which the Toltecs (second half of the first millenium A.D.) belonged. The Aztecs, too, were but a branch of the Nahuas, the youngest (cf. Synopsis on p. 536) and so the one whose history is most easily reconstructed. They settled down in Mexico as late as the beginning of the fourteenth century.

Map indicating the regions of the most important tribes in Mexico and the northern part of Central America. The broken line (---) shows the expansion of the Aztec empire by about 1500. The shaded part indicates the region of the Maya settlements.



The Uto-Aztec or Pima-Nahua group of peoples, all speaking cognate languages, formed a moving mass of nomad tribes extending as far north as the Rocky Mountains, while in Central America the solid block of Maya-speaking peoples acted as a kind of barrier to this pressing human tide. The Mayas were settled in the tropical forests and the mountainous regions of Guatemala, Chiapas, and Tabasco as well as in the limestone peninsula of Yucatan. Even today, more than a million people speak Mexican (Aztec) and more than a million have preserved the Maya idiom.

Other nations besides these also played a rôle in history. "Chichimeca" was the generic name applied to the tribes in the northern part of the Valley of Mexico. Scattered over the highlands of Central Mexico were the Otomi, who may have been descendants of the original inhabitants of the country. Their western neighbours were the Tarascans of Michoacan. Where the hills of Oaxaca fall away to the sea, the

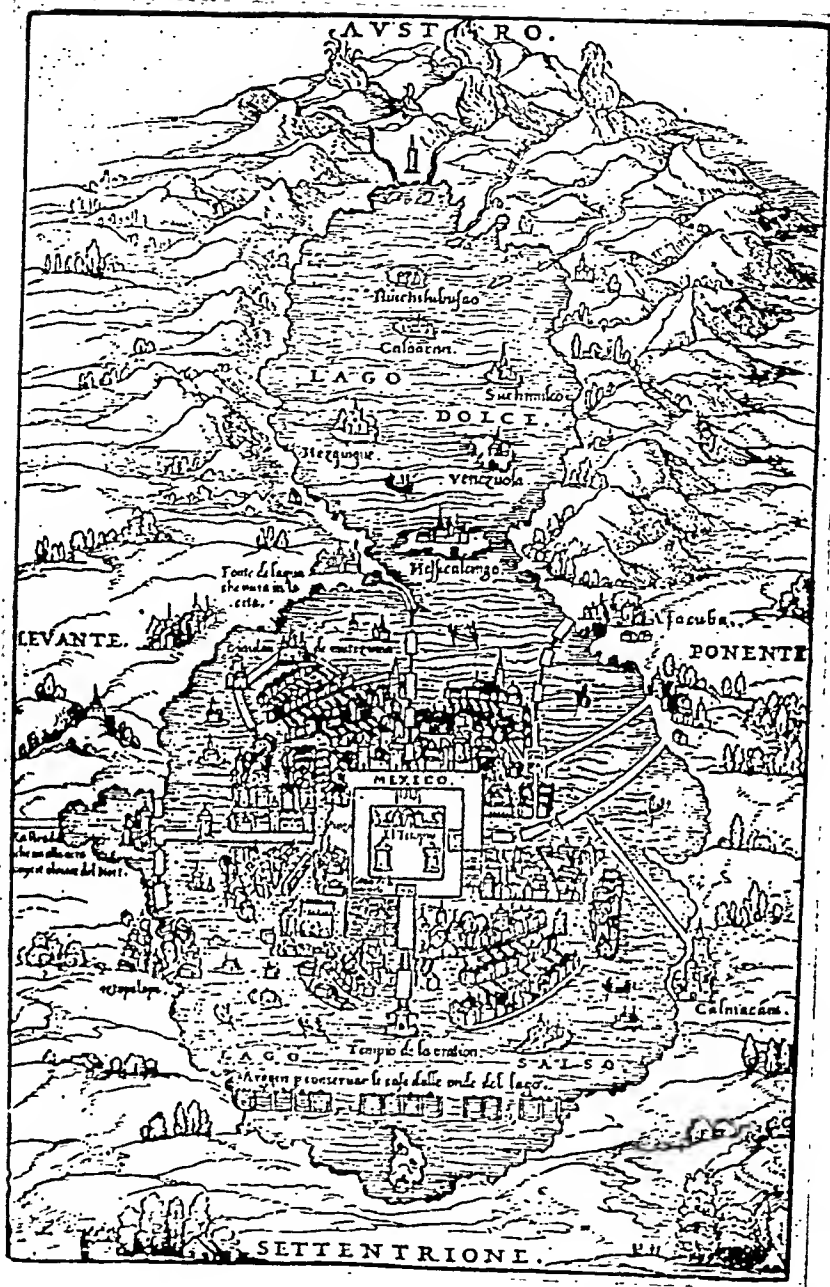
highly civilized Zapotecs and Mixtecs had their cities. On the hot plains along the Gulf of Mexico (Vera Cruz), Cortés found his first allies, the Totonacs. To the north-west dwelt the Huastecs (a primitive Maya tribe), to the south the Olmecs, who had once played a considerable rôle on the high plateau.

Nahuas and Mayas are the representatives of an old and brilliant civilization, but their annals in picture-writing and their oral traditions as taken down by the Spaniards and by Indians after the Conquest, are lost in myth and fable at a period no further back than the culmination of the European Middle Ages (twelfth and thirteenth centuries). It is true that the date inscriptions of the much older Maya cities of the great period (Old Empire) have been deciphered, but it has not yet proved possible to interpret the contents of other inscriptions, which may be narrative and connected with the former. Consequently, there is no question yet of a knowledge of

Air-view of one of the pyramids of Teotihuacan, the vast ruins of which lie north of Mexico City.



The lake-city of Tenochtitlan-Mexico, the capital of the Aztec empire. Reproduced from the report of an anonymous Conquistador as published by Giovanni Battista Ramusio (1485 to 1557) in his "Terzo volume delle navigationi et viaggi...", Venice, 1565.



Maya history. The two attempts to co-ordinate their way of reckoning time with European chronology which seem the most likely to be correct, are unfortunately marked by a divergence of two hundred and sixty years. An idea of the relative antiquity of Maya civilization can, how-

ever, be formed. When the Spaniards landed they found the Mayas in the latter days of their history. The great cities of the south had been abandoned to the tropical forest almost a thousand years before. The Spanish conquest of the rival city-states of Yucatan proved so difficult an undertaking and

entailed so long and embittered a struggle that everything in the way of a fuller tradition would seem to have perished in the process; not to mention the destruction caused by the iconoclastic zeal of Bishop de Landa (1524-79). This explains why comparatively little is known of the ethnography of the ancient Mayas. It is, however, evident that the main features of their civilization were identical with those of the culture discovered on the high plateau of Central Mexico.

For some knowledge of the historical development of this Mexican civilization we must once more turn to archæology. In the Maya territory, palaces and temples with richly sculptured façades and dated stelæ can fortunately be reconstructed, whereas for the ancient life of the Toltecs and Olmecs of the highlands there are absolutely no dates—only a few vague traditional indications of time. What one finds buried of their houses shows that these were more radically destroyed than those of the Mayas; only their frescoes and painted pottery speak to us in the same way as those of their eastern neighbours. The famous pyramids of Teotihuacan (see illus-

tration on page 538), the "artificial mountain" of Cholula, whose dimensions are greater than those of the Pyramid of Cheops in Egypt, the low pyramid of Xochicalco and others, still stand as landmarks of that ancient civilization. A glance at the table of dates on page 536 will, however, show that there existed an earlier, archaic culture, remains of which have been found in strata excavated beneath the ruins of the Toltec period. The "archaic" tribes had already for a long time cultivated maize, the staple food which has formed the basis of all Mexican civilizations; their pottery had passed beyond the primitive stage and they were familiar with the art of weaving. This archaic culture does not go back anywhere near the beginnings of agriculture; and, strange to say, no traces of primitive hunters and fishermen have as yet been discovered, either on the high plateau or in the Maya country. While the social structure of Peru under the Incas—an empire similarly representative of a late stage of development—clearly showed traces of a fundamentally primitive way of life, even though raised to a monumental level, the civilizations of the Mayas and Nahuas are



The drained area round Lake Texcoco, formerly Lake Mexico, as seen from Cerro la Estrella to the south-west. In the middle distance, houses and maize-fields; beyond, the former bottom of the lake, still marked by pools of water.

distinctly urban and communal, with numerous occupational groups and a differentiated class structure.

Beside the peasant and the artisan there were the merchant and the warrior. The two latter, in view of their vital importance for the comparatively young Aztec state, were accorded high rank. It was the merchants who by their carriers—beasts of burden, not to mention vehicles, were unknown before the Conquest—transported to the capital the priceless treasures of the lowlands: cocoa, tobacco, cotton for coloured clothes, ornamental feathers, precious stones and metals. Cocoa beans, quills filled with gold dust, and blankets were used as currency. Roads and bridges were constructed to facilitate traffic; and it was to safeguard commerce that the Aztec armies spread their garrisons over wide areas. There was no question of territorial rule in the remoter districts: the regular payment of tribute was enforced, but for the rest the dependent peoples were left to themselves.

Under King Motecuzoma I a regular feudal aristocracy developed, owing to a policy of military expansion. In all the conquered territories royal demesnes were set aside and given in fief to warriors of outstanding merit. This new nobility was distinguished by symbols of rank conferred by the ruler: helmet-masks in the shape of animals' heads, feather-covered frameworks worn on the back, feather ornaments and painted pictures on their bucklers. The king (tlatoani, the "speaker") was chosen from among the members of the royal family by a parliament of notables and elders representing the clans. He was assisted by the Cihuacoatl, who derived his name signifying "Snake Woman" from a goddess and who often played the part of a second chief.

When in the fatal year "1 Reed", in which the Aztecs expected the return of the bearded white divinity of the Toltecs, Quetzalcoatl (see illustration on page 552), Cortés landed on the coast of Mexico and after many adventures reached the pass between

the mighty volcanic massifs of Popocatepetl and Iztacciatl by which he entered the high valley of Mexico for the first time, an incomparable view opened out before the astonished eyes of the Conquistador and his little band. It is true that they had already beheld with amazement the towering white masses of Maya cities gleaming along the coasts of Yucatan, that they had admired the wealth displayed in the Totonac houses at Cempoallan and that all their expectations had been surpassed by what they encountered at Tlaxcala and within the sacred precincts of Cholula while climbing up into the cooler air of the highlands; but after crossing the pass they seemed to enter an enchanted world. At the foot of oak- and pine-clad slopes a wide valley stretched into the distance, enclosed by another chain of high mountains on the far side. Along the bottom of the valley gleamed a chain of variegated lakes while vast tracts of arable land divided into strips of maize fields and agave plantations lent colour to the scene. Scattered among the fertile fields and along the shores of the lakes, lay villages and towns embowered in flower gardens; while far out in the centre of one of the lakes, a vast Indian city of about three hundred thousand inhabitants rose out of the water 7,000 feet above sea-level: Tenochtitlan-Mexico. Banked-up causeways, alternating with bridges over countless waterways, radiated from the city to the shores of the lake. Rising above the mass of flat roofs could be seen the great terraced pyramids crowned with temples and rambling palaces. Canoes flitted across the waters of the lake while the causeways were filled with the busy coming and going of foot passengers. Truly it must have seemed like a city in one of those fantastic tales of romance then so much in vogue in Europe.

Two years later this American Venice had been levelled to the ground. After the lapse of years, the Spanish colonial town of Mexico rose on the same spot. Thanks to artificial drainage, this city, which has grown into one of the largest and finest in Latin America, now stands on dry land.

Half a century after the Aztec state with its vast network of military and commercial organization had come to a sudden end as the Spanish Captain-General, Hernando Cortés, stormed and destroyed the lake-city of Tenochtitlan-Mexico, a small volume appeared at Christopher Plantin's printing-office in Antwerp describing the drugs discovered in the New World. The author of the book was the famous municipal physician of Seville, Dr. Nicholas Monardes (1493 to 1588), who has left us several works on medicinal herbs.

Monardes's three-volume Spanish work on American drugs had appeared at Seville in 1565. No less a person than the great botanist Carolus Clusius (Charles de l'Ecluse, 1526-1609) then published at Antwerp, in 1574 and 1582, Latin translations entitled: "De simplicibus medicamentis ex occidentali India delatis," Books I & II, and "Simplicium medicamentorum ex novo orbe

delatorum . . . historiae liber tertius". Dr. Monardes, who never visited America, did not confine himself to examining and describing the Indian remedies which the Spaniards brought back to him, but also sought to apply them. In addition to the indications and recipes of the Indians he makes suggestions of his own based upon personal therapeutic experience. There is, for instance, his interesting remark that sarsaparilla—a gift to Europe from the New World—is more effective when applied according to the Mexican recipe than in the manner current among contemporary doctors. According to Monardes—and the Mexicans—the juice should be pressed out of the root of this plant (*Smilax officinalis*, Aztec: *mecatli*) and drunk hot, morning and evening, on an empty stomach, and the dose should be followed by a two hours' sweating cure, for which Monardes suggests wrapping up in blankets. Another drug from

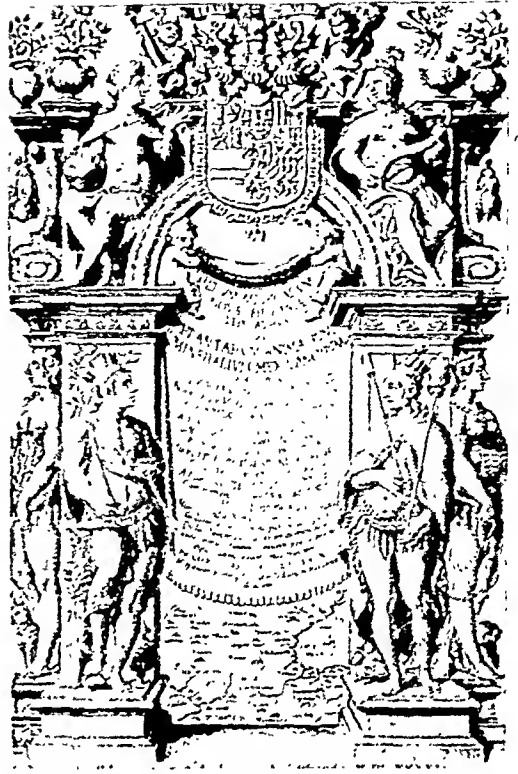


The Conquistador Cortés (on horseback), accompanied by Spanish soldiers and allied Tlaxcaltecs, is being attacked by Aztec troops. The warrior on the right is bearing a wooden sword armed with splinters of obsidian. Reproduced from a Tlaxcaltec account in picture-writing composed after the Conquest (*Lienzo de Tlaxcala*).

the Aztec pharmacopœia, tacamahaca, a tree gum, came to be regarded as a universal remedy in the sixteenth century. Strange to say, Dr. Monardes also testifies to irrational cures effected by Mexican stone amulets; among others he mentions a nobleman of his acquaintance who was obliged to lay aside his amulet against kidney trouble because of its excessively diuretic effect; on the other hand, he failed—contrary to the experience of other Spanish physicians—to obtain results with the Mexican type of amulet supposed to stop hæmorrhages.

By order of King Philip II, another, even more famous, medical man undertook to compile, at great cost, an immense work dealing with the natural history of the New World and the remedies to be found on that continent. Little is known of the life of the Royal Physician-in-Chief for the West Indies, Dr. Francisco Hernandez (1514? to 1587?)—not even the date of his death is established. His work comprising twenty-four books of text supplemented by ten volumes of illustrations of plants as well as a separate atlas of animal studies, all composed and put to paper in the City of Mexico, long remained unpublished. It was only in 1628, after the Royal Physician-General of Naples, Dr. Leonardo Antonio Recchi, had re-arranged and abridged the text expressly "for the use of the medical profession" that the Accademia dei Lincei in Rome brought it out under the title: "*Rerum Medicarum Novæ Hispaniæ Thesaurus*". This shortened version still contains accounts of over four hundred medicinal plants, for each of which we are given the Indian name, a botanical and pharmacological description mostly accompanied by an illustration (see illustration on page 544), and finally the diseases for which the plant was used.

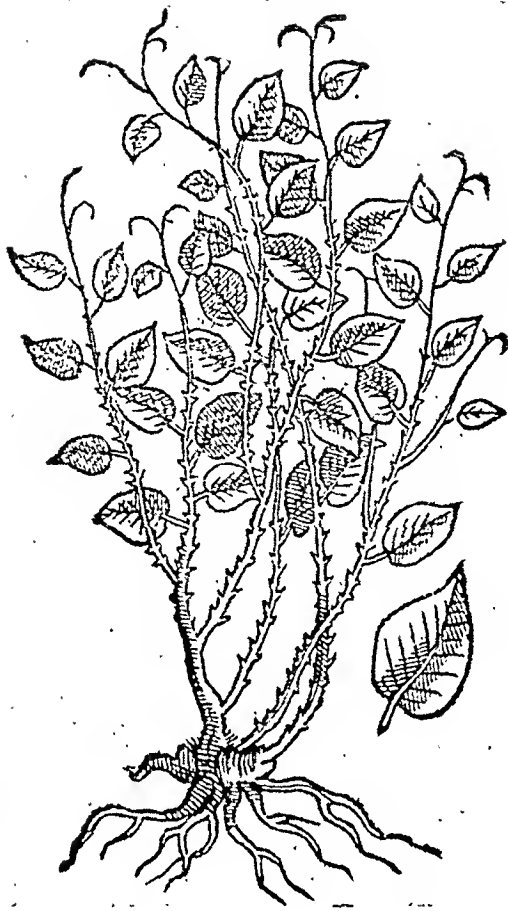
Further valuable material for a history of ancient American, in particular Peruvian, medicinal botany is to be found in the works of the Jesuit, Bernabé Cobo, who spent fifty-six years in America and in 1653 wrote a "*Historia del Nuevo Mundo*"



Second title-page of a later edition of Dr. Francisco Hernandez' work, Rome, 1651.

(first published by Marcos Jiménez de la Espada, Seville, 1890-3). In more recent times, a commission appointed by the Academy of Medicine and Surgery of Mexico compiled a collection based on these older authors as well as on a knowledge of local botany. The results were published in book form, but this "*Ensayo para la Materia Médica Mexicana*" which appeared at Puebla in 1832 is now an extremely rare publication (Dr. Georg Friederici).

The Conquest blighted the developing civilizations of America and led to the almost systematic extermination of the intellectual leaders. Yet, side by side with the only too well-known examples of Spanish violence one finds traces of a genuine colonial policy. Not only do simple soldiers and minor officials write down factual reports of what they have observed but almost from the beginning one hears of a regular Colonial Institute, the College of



Sarsaparilla (Smilax officinalis). One of the illustrations of plants in Francisco Hernandez' work as revised by Recchi and later published by the *Accademia dei Lincei*, Rome, 1651.

Santa Cruz, established under the patronage of the Viceroy at Tlatelolco, the north-western suburb of Mexico City. In this college, Spaniards could become acquainted with the achievements of Ancient Mexico while young Indians of the upper classes received whatever instruction they chose in reading and writing, Spanish and Latin, Theology and Ethics as well as in Medicine. Spanish colonial legislation was in fact exemplary; the trouble was that practice in no way conformed to theory.

Among the Franciscan friars who taught at the College was one named Fra Bernardino de Sahagun. He had studied at Salamanca and came to Mexico in 1529, ten years after the Conquest. After familiarizing

himself with the Aztec language, he persuaded four pupils of his to assist him and began research work along ethnological lines, using methods that would be considered modern today. The results of this research he compiled into a unique encyclopædia of Ancient Mexico. Reading the old texts which Sahagun collected one seems to hear his informants, mostly priests and learned men, speaking aloud in their Aztec tongue. But the good friar found little understanding or appreciation among those in authority. It was with the greatest difficulty that he finally, in 1569, completed his manuscript dealing with the "General History of New Spain" together with an abridged Spanish version of the text, which first appeared in print (Mexico, 1829-30) at the time when Alexander von Humboldt introduced the era of Mexican studies. In 1880, a French translation by Jourdanet and Siméon was published in Paris under the title: "Histoire Générale des Choses de la Nouvelle Espagne". The original manuscripts in the Aztec tongue are preserved at Madrid and Florence. The greater part of the Madrid manuscript was published in facsimile in 1905-6 by Francisco del Paso y Troncoso but no edition of the Florence manuscript has as yet appeared. Thanks to the efforts of Eduard Seler a part of the text has been made accessible (Stuttgart, 1927). An English translation of Books 1-4 by F. R. Bandelier appeared at Nashville, Tenn., in 1932.

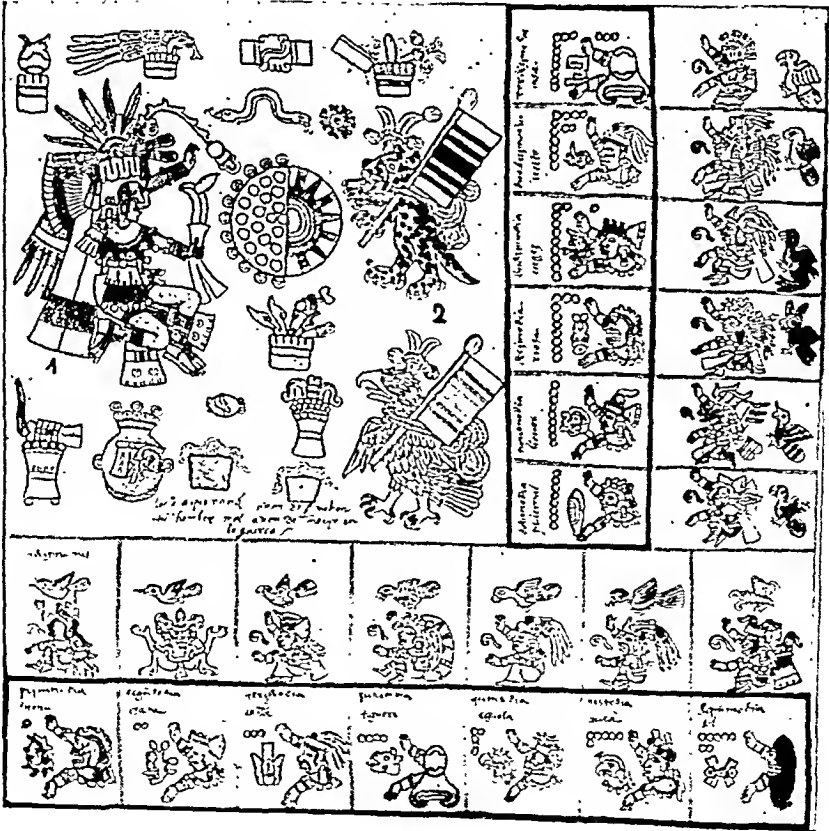
Sahagun's chapters on medicine are based on the information provided by eight old Indian doctors of Tlatelolco who were still practising openly and who had the reputation of being very experienced. It is this old monk therefore, living in Mexico to the age of ninety, who has left us the most important literary source on the way of life and the medical science of the Aztecs.

The above-mentioned ancient sources, with the exception of the "*Materia Médica Mexicana*" to which I could not get access, form the basis of the following short chapters; facsimile editions of Mexican picture-writing have also been used for the illustrations.

In his letter to the emperor Charles V, dated 30 October 1520, Cortés gives an enthusiastic description of the lake-city of Tenochtitlan-Mexico, which he compares to Venice. His account very rightly draws attention to the exemplary way in which the city was provided with drinking-water. The water of the surrounding lake being brackish, the drinking-water was carried to Tenochtitlan from Chapultepec in pipes running along the causeways. These pipes consisted of two parallel covered stone runnels of which one was in constant use while the other served as a reserve for periodic cleaning and repair. In the city itself the water was carried down the canals in canoes and sold in such quantities that the rich were able to lay out flower-gardens with fish-ponds.

It was with astonishment indeed that the Spanish chroniclers, Cortés himself and Bernal Diaz del Castillo, watched the daily market in the north-western suburb of Tlatelolco. Porticoes surrounded the square and each type of commodity was sold in its own quarter : food-stuffs from the country—there were also eating-houses—a wealth of objects turned out by craftsmen, and finally quantities of medicinal herbs. To this day, Indian women sell their medicines on the market square ; Starr reports that over two hundred different remedies from the animal, vegetable, and mineral kingdoms are often to be found there. In ancient times, head-masseuses plied their trade on the market, using special herbal hair-pomades ; dealers in dyes spread their colours in small baskets

Page of a Tonalamatl calendar. The reigning deity is Patecall (1), the god of pulque. He is attended by the symbols of war, jaguar and eagle (2). The series of day signs (here outlined in black for clearness) are supplemented by other symbols. Reproduced from the Old-Mexican Codex Borbonicus.





Diviner casting grains of maize before the image of the Wind god Quetzalcoatl, who is represented in the top right-hand corner. The fortune-teller is a woman. From the post-Columbian Old-Mexican Codex Magliabecchiano.

placed on big flat ones and also sold the yellow medicinal pomade which they prepared from the fat of the cochineal (*Coccus cacti*, Aztec: *axin*), medicinal bitumen (*chapotli*), and various animal and vegetable remedies such as opossum tail (*Didelphys*, Aztec: *tlauatzin*) as well as herbs and roots. In the lane reserved for the sale of herbs, etc., the apothecaries, who were expected to have an extensive knowledge of plants and minerals, spread out their drugs, pomades, potions, and powders on mats. An immense number of purgative, emetic, blood-depurative, and diaphoretic plants were known to the Aztecs. The dealer in black gum (especially the resin of the *Castilleja elastica*, Aztec: *ulli*) not only made the rubber balls for the ritual ball game but also prepared bits of molten resin for medicinal purposes. Country folk of the Tamime-Chichimeca tribe, famous for its knowledge of herbs, were also known to peddle their "patli" (medicines) from house to house in bags on their backs.

The Aztec polity formed part of that world-encircling zone of ancient city cultures which extended along the southern rim of the northern continents by the "Mediterranean" seas of Europe, Asia (India), and America. Now one of the characteris-

tics of these cultures, leaving aside typical features of religious practice and general outlook, was the differentiation of crafts in the wider sense of the term. It is, therefore, not surprising to find Mexican healers of both sexes divided into several categories of specialists, of which Sahagun mentions more than ten. Just as the artisans were grouped in a kind of guilds, so the physicians and the witch-doctors formed professional groups which may well have been responsible for the training of the rising generation of colleagues.

The maize goddess Chicomecoatl, a youthful variant of the Earth goddess and patron of medicine, Tlazolteotl, wearing a high ornamental head-dress and holding up corn-cobs on each side of her face. Ethnological Museum, Basle, Switzerland.



The ceremony of human sacrifice being carried out before the shrine at the top of the temple pyramid. One victim has already been hurled down the steps. The heart torn from the living body is shown mounting towards the sun. From the post-Columbian Old-Mexican Codex Magliabecchiano.



Even the diagnosis of disease, effected by divination, demanded the co-operation of several persons, among whom women played a conspicuous part. The calendar augurs (tlapouqui) foretold the course of the illness and the patient's ultimate fate from the date of his birth or that of the inception of the disease. The Aztecs measured time by a solar year divided into eighteen months of twenty days to which they added five complementary days (nemontemi) in order to make up the full number of three hundred and sixty-five. The individual days of each month were characterized by twenty different signs, ideograms of a kind of zodiac. Besides this civil year, the priests constructed for themselves another, augural year described in the Tonalamatl, the "Book of (good and evil) Days". In this, the signs for the twenty days of the month were continuously combined with thirteen number symbols (dots) in such a manner that the fourteenth sign coincided with the symbol for 1, marking the beginning of a second series of thirteen, and so forth. At the end of two hundred and sixty days, a new tonalamatl began, marking the renewed coincidence of the first sign and the first number symbol. This sequence of two hundred and sixty could be split up in various

ways, among others into twenty columns of thirteen days; the sign of the first day in the column was then said to dominate the whole thirteen and was connected with a ruling divinity. It was not by the stars but by the attributes of this reigning deity, by the symbols connected with it, and finally by the significance of the sign for the day (see illustration on page 545) that the calendar augurs established the horoscope. The sign of the day and of the hour when a child was born showed whether it would be strong and healthy or sickly. A loophole for escape was, however, left open: the naming of the infant could be postponed. The calendar augurs would also indicate the most suitable days for those recovering from illness to sacrifice to the divinity that had effected their cure. On certain "unlucky" days even physicians would quit their patients, remarking that there could no longer be any hope of a cure unless a god intervened. The "nemontemi" or last five days of the year were considered particularly baneful.

From these remarks it is clear that the chronology of the Aztecs had considerable influence upon the practice of medicine.

The signs for the different days were variously apportioned to different parts of

The "Besom Feast" held in honour of the Earth goddess, Tlazolteotl, patron of medicines (centre figure). The top of the picture shows the festive procession: in the centre, the chief actors of the ritual are standing on the platform of a pyramid while warriors and phallus-bearers dance round them. From the Old Mexican Codex Borbonicus.



the body or to different items of the national dress (see front cover). Pictures like the one on page 550, showing the influence of each particular day upon some special part of the body were used by physicians when they attended the sick; by indicating the cause of the malady the pictures were supposed to point the way to recovery.

Besides the calendar-augurs we find another class of diviners, called water-gazers, who threw chewed grains of maize into bowls of water. If the grains sank, they foretold recovery, if they floated, death. There were also "casters of lots" who scattered twenty grains of maize on a cotton cloth spread over a mat and then made their diagnosis from the position of the grains: if the centre of the cloth remained empty, death would ensue; if two or more grains fell on top of one another the illness was assumed to have been caused by

sodomy; but if the grains came to lie in two halves then recovery might be expected. Another kind of soothsayer worked with a knotted string; if the knots came undone when the string was pulled taut, the patient would recover, if not he was doomed.

To the diagnosticians we must add the medicine-men, "tetlacuicuilique", i.e., "those who draw things out of the body", a basic type which is to be found among the most primitive races. These medicine-men blew upon the bodies of the sick and after having chewed wormwood leaves (yautli) and sprinkled them on the painful parts, which they also examined with their fingers, proceeded to draw sham "worms" out of teeth and eyes, or pebbles, tiny obsidian knives, and paper made from the bark of tree out of the body. They would also suck out blood and matter with the help of wormwood. A peculiar method of treating

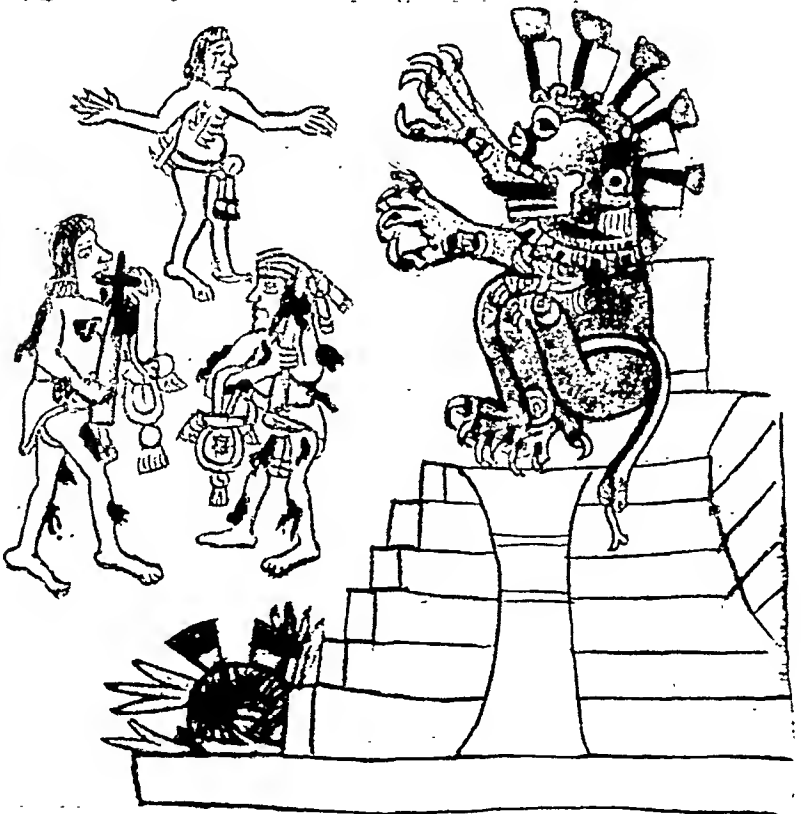
children is recorded : they were strung up with their heads down, their palates were pressed, their legs pricked, and the following day they were treated with salt and tomatoes. Such witch-doctoring was frequently carried on by women.

Rational, scientific healing as understood nowadays, was practised by surgeons and physicians (ticitl), men and women, who were expected to have an extensive knowledge of botany and mineralogy. They prescribed remedies and nursed the sick, were versed in surgery and the dressing and stitching of wounds, and set bones. The treatment of gout as well as massage in the two forms of effleurage (stroking) and pétrissage (kneading) was also their business. Regular hospitals with surgeons were established on the battlefields. To judge from the accounts given by the Spaniards, the wounds inflicted with the Mexican wooden swords (maquauitl) armed on either edge

with a series of obsidian blades (see illustration on page 542), must have been of a grievous nature. The best protection was afforded by a tight-fitting jacket of quilted cotton.

The physician would begin his treatment by handing the patient a kind of snuff made of the zozoyatic plant (N. O. Liliifloræ) which relieved headaches and when administered in larger doses caused bleeding of the nose. If no definite diagnosis could be established, the physician administered intoxicating Eupatorium seed (quauxoxouqui) dissolved in water ; under the influence of this narcotizing potion and probably also of hypnotism, the patient would then reveal the nature of his disease. Sometimes the physician would put himself into a state of trance partly by auto-suggestion and partly with the help of a drug called ololiuqui (seed of the wild convolvulus *Ipomæa sidæifolia*, Aztec : couatl-xoxouqui) and in this state of

Ceremonial blood-letting from ears, tongue, arms, and legs as practised before the image of Miclantecutli, the God of the Dead. We see the blood smeared on the bale of grass at the foot of the temple steps. From the post-Columbian Old-Mexican Codex Magliabecchiano.



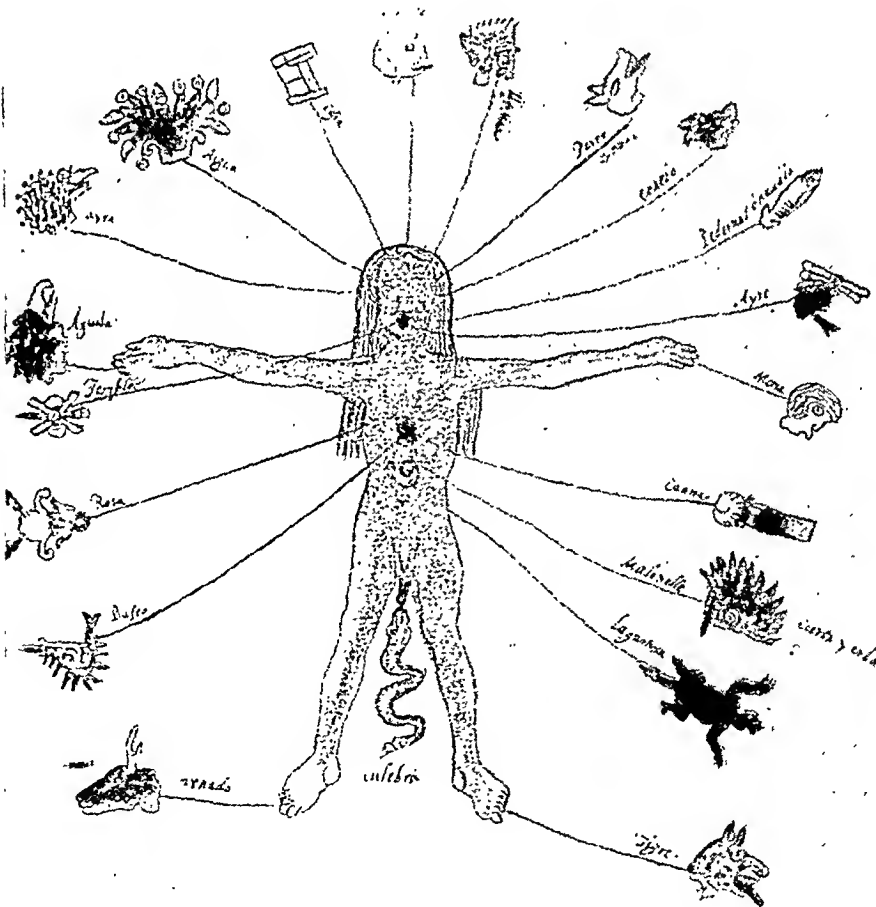
trance would himself give the diagnosis.

Specialists in certain forms of medical treatment were distinguished from the general practitioner. The phlebotomist practised both blood-letting and scarification with a small obsidian knife. Among the priesthood blood-letting as a kind of religious mortification was of daily occurrence ; on high festivals it was extended to the entire population (see illustration on page 549). Another form of surgery originally intended as magical protection consisted in inserting ornaments in the lips and ears, and in piercing the septum of the nose so as to admit a nose-stick—the exclusive badge of Aztec princes and divinities. Besides phlebotomists we find specialists whose business it was to cure looseness of the bowels and to administer purgatives and enemas. Then there were dentists " who

drew worms out of the teeth " and oculists (teixpatique) who treated sore eyes and operated on eye nodules.

The midwives (ciua temixiuitique) formed a class of their own, whose work was so outstanding that a later chapter will be devoted to this subject. The (successful) art of abortion was also considered a legitimate branch of the medical profession.

Finally there were the overseers of baths. They played a considerable part in Aztec therapeutics because the treatment of almost every illness, and in particular that of nervous twitchings, included a vapour-bath (temazcalli) and sweating-cure administered by professionals. Convalescents, pregnant women, and mothers after childbirth crawled into the domed brick bath-houses, the heated floors of which were sluiced with water (see illustration on page 564). Care



" Vein man " for the use of Aztec doctors. The calendar signs are shown as corresponding to different parts of the body. From the post-Columbian Old-Mexican Codex Vaticanus A.



Perforation of nasal septum so that it admits a nose-stick. The instrument used is a bone dagger. From the Old-Mexican Codex Nuttall.

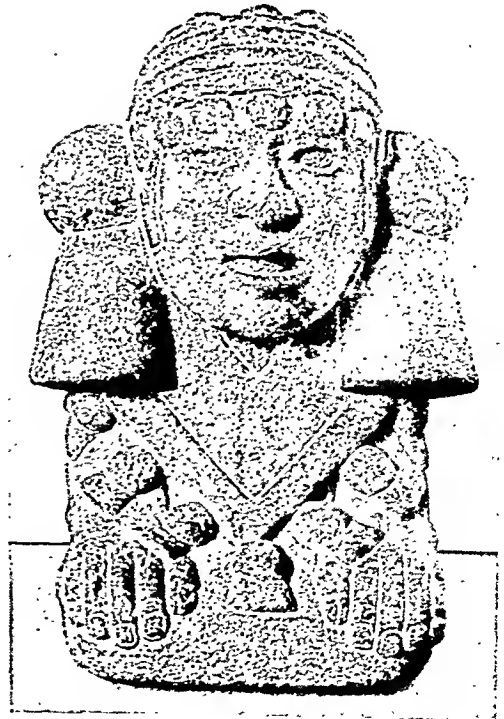
was taken to use non-smoking wood for heating the bath-house, and sometimes herbs were added to the water with which it was sluiced.

Having treated of soothsayers, medicine-men, and physicians, we must also touch upon sorcerers. The Swiss physician and ethnologist Otto Stoll (died 1922) gave it as his opinion that the Aztec "illusionists" (teixcuepani), by dint of specializing, developed abilities quite as striking as those of the familiar jugglers of India. The Huastecs living along the Gulf were adepts in prestidigitation. Among other feats we read of living figurines produced out of a bag, of fish-ponds conjured on to dry ground, of imaginary fire set to houses in such a manner that the flames could be seen bursting out, and of the conjurors cutting themselves in pieces. Another category of sorcerers (naualli) trained serpents to hunt for thieves and predicted storms and epidemics. They were said to possess the power of transforming themselves into animals. That there were real shamans among them is proved by accounts of wanderings in the Nether World. According to Duran, a group of magicians set out at the bidding of King Motecuzoma I on a quest for Aztlan, the cradle of the Aztec race. The Mexicans also practised black magic. The usual kind of spells based upon analogy were cast by the "tlacatecoltl" (man-owl) while the "heart eater" specialized in making people fall ill.

Through the writings of Stoll the hypnotic practices of the "temacpalitotique" have achieved a certain fame. This tribe of low-born sorcerers preserved and used as an instrument for their machinations the stolen lower left arm of a woman who had died in child-birth and had been deified (see cover illustration). Having fixed upon a certain house, a band of these men would break into the dwelling, hypnotize the inhabitants into sleep or immobility, and then plunder the goods and even violate the women.

The Aztec doctors, midwives, and sorcerers all worshipped as their special deity the mighty goddess Tlazolteotl (Eater of Filth), an Earth, Moon, and Maize divinity also known as Teteoinnan, the "Mother of the Gods". Her image was placed over the bath-houses; obviously she was venerated

Chalchiutlicue, the Goddess of Flowing Water. She is squatting on her heels in the fashion customary for Aztec women. Ethnological Museum, Basle, Switzerland.





The female patron of doctors, the Earth goddess Tlazolteotl, is represented wearing the skin of a flayed victim and bringing forth a child. The child is also shown floating down as a symbol of conception. From the Old-Mexican Codex Borbonicus.

as the divinity of medicinal herbs and remedies (see illustration on page 546). The autumn harvest festival, Ochpaniztli (Besom Feast), the eleventh of the year, was sacred to Tlazolteotl. The organized groups of those skilled in the healing art took an active part in the ritual. The "month" marked by this festival included the end of August and the beginning of September. In the course of the opening dance, which extended over several days, kings and noblemen appeared disguised as medicine-men, wearing sacerdotal jerkins and mantles with butterfly designs and carrying calabash pipes slung across their backs—tobacco pills being used as a means to seeing visions.

For the main ceremonies a slave-girl was bought and clothed in the traditional dress of the goddess. There followed eight days of soundless dancing, consisting only of movements of the hands without the usual

accompaniment of conchs, flutes, and drums. As the sacrificial victim was not supposed to know anything of the fate awaiting her—tears would have been of ill omen—the women doctors, from the fourteenth day of the festival on, sought to distract her by a kind of tournament, for which they split into groups and pelted one another with leaves and flowers while dancing all the time. Then, when the fatal hour arrived, the slave-girl dressed as a goddess, was led into the city at dead of night under the pretext of going to meet her bridegroom. Accompanied by the women doctors and midwives she made her progress through absolutely silent crowds, walking along canals and over bridges until she came to a certain pyramid, one of the

Quetzalcoatl, the bearded old Moon god and priest-king of the Toltecs, the bringer of civilization and the inventor of magic. He is represented in a sitting posture, sleeping with his chin on his arms. Ethnological Museum, Basle, Switzerland.





Marriage ceremony. The bridegroom (1) takes the bride on his back in front of the temple pyramid (2). From the Old-Mexican Codex Nuttall.

of his own future birth. At break of day, the priest wearing the mask of the goddess sacrificed four prisoners and then proceeded to the temple of Cinteotl, escorted by the "Huastec attendants", by warriors and phallus-bearers, and surrounded by crowds of chanting women doctors (see the illustration on page 548, which gives an idea of the masks and disguises).

From this short account it is clear that the doctors, midwives, and medicine-men played an active part in the Tlazolteotl festival, the magnificent ritual games of which were supposed to guarantee the rejuvenation of food-giving vegetation. During

The Wind god Quetzalcoatl represented as a priest carrying his bag of sweet-smelling copal gum for incense-burning. The figure is repeated on the four sides and on the top of the stele and, therefore, indicates the four cardinal points. Ethnological Museum, Basle, Switzerland.



twenty-five temple pyramids rising high above the flat roofs of the city. Here a priest lifted the victim on to his back, as a bridegroom would his bride (see illustration on page 553), while at the same instant another priest cut off her head. During the whole of this ceremony not a sound was allowed to break the stillness of the night.

The victim was flayed as on the similar occasion of the festival dedicated to the god of spring, Xipe Totec ; a priest then clothed himself in the skin of the victim and donned the mask of the goddess Tlazolteotl. In this disguise he ran through the streets of the town ceremonially pursued by warriors with besoms. In the great temple dedicated to the Aztec war god Huitzilopochtli ("Humming-bird on the Left") the mask of Tlazolteotl encountered the mask of her son, the Maize-god of winter, Cinteotl, surnamed Itztlacoliuhqui ("Curved Obsidian Knife"). Four times did the mask of the goddess (see illustration on page 548) take its stand before the image of Huitzilopochtli, straddling its legs to express the goddess's readiness to conceive, while the mask of her son Cinteotl stood beside it as a symbol

other feasts; the dance-actors represented not the healers but the diseases which were the object of their ministrations. Every eighth autumn the Tlazolteotl feast was supplemented by the "Atamalqualiztli" (bread and water fasts) which were also intended to make the foodstuffs "grow young again". On these occasions the dancers were dressed to represent lepers and syphilitics as well as animals and human activities. At Cholula, the myth of the great god Quetzalcoatl was played by masks, some of which also represented diseases.

This Quetzalcoatl (Plumed Serpent) was a deified priest-king of the Toltecs, those semi-mythical forebears of the Aztecs from whom their higher civilization was derived; he was also regarded by them as the inventor of both medicine and magic. According to mythical accounts Quetzalcoatl was

compelled to leave his native land and disappeared towards the East, whence it was said that he would one day return (see illustration on page 552). It is well-known how the Spaniards profited by this tradition. The four wise men: Oxomoco, Cipactonal, Tlaltetecuin and Xochicauaca were said to have been the first Toltec doctors. Oxomoco and Cipactonal were also the inventors of the Tonalamatl calendar. By thus connecting it with their remote ancestors, the Aztecs gave to medicine as to all the other arts a sanction which ensured its importance in their general scheme of things.

There could be no question of a history of Aztec medicine because of the short span—a mere two or three centuries—allotted to this race in the story of universal development while the history of the Toltecs is lost in the mists of fable and has left no definite tradition.

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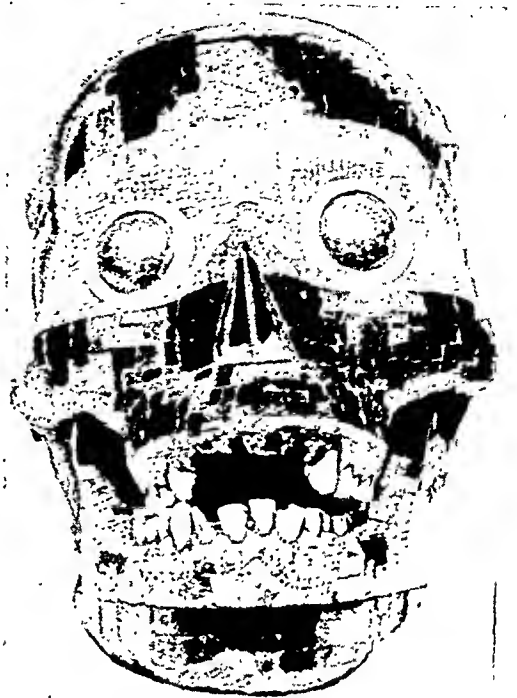
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Medicine forms "a prodigious chapter in the early annals of America . . . the skill of the Indians, in so far as it was genuine, appearing of far greater importance than it would today, because of the low ebb at which medical science found itself in Europe at that time" (Friederici). As a matter of fact, the pathological knowledge of the Aztec doctors seems to have been considerable. Dr. Hernandez enumerates over two hundred diseases as known to the Mexicans while the (abbreviated) Spanish text of Father Sahagun mentions about one hundred, and such parts of his Aztec version as have been published contain names of diseases in picture-writing which often defies interpretation; the frequency of their occurrence suggests an even greater number of terms in the unpublished part of the text. In another section of his work, Sahagun has also given us a list of remedies classified according to the ills they are intended to alleviate, from which we can gain a rough idea of Aztec systematic pathology.

The list includes diseases of the head, eyes, teeth, and nose; of the throat and pharynx; pains in the chest, ribs, and back; troubles of the stomach, abdomen, and bladder; various other affections, especially skin diseases; finally, wounds, fractures, and dislocations. From this it appears that the different parts of the body were taken as the principle of classification though it is not always strictly adhered to. Wounds are treated in a separate chapter, nevertheless they make another unexpected appearance among diseases of the head such as hair-trouble, abscesses, and headaches, and even fractures of the skull are dealt with in this connection. Earache is put together with lesions of the auricle, a cold in the head with a broken nose, etc. Care of the teeth is introduced under toothache; affections of the throat include goitre, a crick in the neck, tonsillitis, and cough. Or again, pains in the chest, lack of milk in nursing mothers,



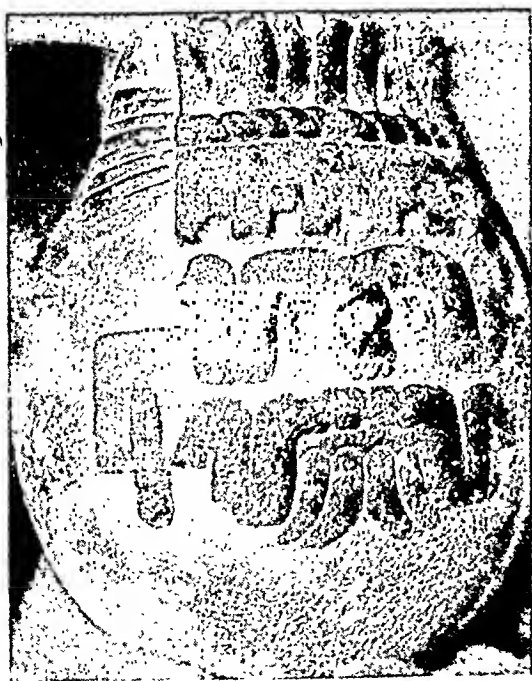
Old-Mexican skull mask. The front of the skull of a man of about thirty, covered with an inlaid mosaic of lignite and turquoise. The eye-balls are of pyrites surrounded by a ring cut out of a shell. British Museum.

fractures, or rheumatism in the bones of the upper part of the body and chronic cough with expectoration are all treated under one heading. A further disruption of the systematic classification is sometimes caused by the fact that the same medicine can be used for affections in different parts of the body. The Aztecs were not only familiar with the effects of poisoning but also with the detrimental consequences of overdoses of medicine. A special chapter is devoted to relapses such as are caused by premature sexual intercourse during convalescence. The fact that the Aztecs recognized a connection between peeling lips and hepatitis does credit to their pathological acumen.

That their knowledge of anatomy was also exceptional is beyond a doubt. Un-

fortunately Sahagun omitted from his Spanish version the chapter in his Aztec original dealing with "the outer and inner parts of the male and of the female body". The text is only available in facsimile and is difficult of access. It is, however, clear that a nation addicted to war and to human sacrifice on an immense scale in the course of which the palpitating hearts were torn out of the bodies of thousands of victims, must have had a fairly accurate notion of anatomy. The opening of the victim's breast with an obsidian knife (*itztli*) thrust upwards between the ribs, while the body was stretched backwards over a conical block of jasper with slightly convex upper surface; the numerous houses of skulls in the temple courtyards as well as surgery on the battlefield afforded ample opportunities for studying the structure of the human body. It is not astonishing therefore that artistic representations of hearts and skulls, such as the precious, cut-crystal skulls in Paris and London, are often disconcertingly realistic (see illustrations on pages 547 and 562).

Old-Mexican stone jar showing the face of the Rain god Tlaloc, surmounted by cloud-battlements. Ethnological Museum, Basle, Switzerland.



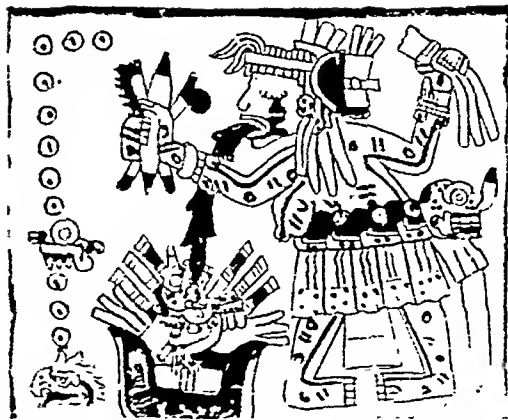
The drinking of pulque (agave wine) during a feast. An old man (6) and an old woman (7) are being served by young people. From the post-Columbian Old-Mexican Codex Mendoza.

Side by side, however, and closely connected, with this entirely rational and highly developed pathology, there runs a current of profoundly irrational, supernatural ætiology, which explains certain illnesses as sent by the gods in punishment for sin. This explanation was chiefly applied to contagious diseases of a particularly afflicting or loathsome character. "Commoner" ills were more readily susceptible of a "natural" interpretation unless they happened to be attributed to the enmity of a malevolent medicine-man. Wounds, finally, could hardly be regarded as in any way supernatural. Sahagun, when speaking of this "sin ætiology", gives descriptions of symptoms which evidently recur in many pictographic representations. True, none of these old Mexican records in picture-writing treat of medicine; they usually contain accounts of mythological or historical events which they describe in often lavish, painted sketches accompanied by hieroglyphic signs and symbols; or else they register "facts" connected with augury and with the establishment of calendars; but

characteristics of disease are among the attributes of some of the deities and mythical figures in the pictures.

Illnesses which appeared to be caused by cold, such as gout, palsy, or rheumatic pains, were generally attributed to the Rain gods, the Tlaloque, who dwelt on the mountain tops. At their head stood Tlaloc (He who causes to Sprout), the great Rain god who from a stone jug poured the precious moisture over the arid uplands of Mexico (see first illustration, p. 556). The sixteenth annual feast, known as Atemoztli and celebrated in December, was sacred to the Rain gods. In the course of this festival, old people of over seventy were allowed to drink "pulque" (Aztec : octli), a wine made from the juice of the flower-stalk of the agave, until they were intoxicated. In ancient Mexico this pulque was accounted a sacred and medicinal beverage ; this explains why the god of pulque (see illustration on page 545) was called Patecatl (He who comes from the Land of Medicine). It was only as part of a rigid ritual that the old were permitted to drink agave wine at all and especially to inebriation. The young were forbidden drink altogether except at one religious festival (see illustration on page 556), and if found drunk were mercilessly executed (see ill. on page 558). Those who started drinking too soon during the feast or were guilty of drinking in secret were supposed to be punished by the offended gods. Tlaloque afflicted them with a kind of possession indicated by a crooked mouth, twisted and contracted or trembling hands and feet, quivering eye-lids, running of the eyes, and tremulous lips.

Epilepsy was also attributed to the demonic influence of dangerous gods without being considered a punishment for sin. It was believed that during the "unlucky" days : 1Rain, 1Ape, 1House, 1Eagle of the Tonalamatl calendar used by the augurs, the Ciuateteo (Divine Women) who had died in childbirth came down from the skies and waited at crossroads or outside the house to take possession of human beings, especially children. Epilepsy, paralysis, and



Cihuateotl, one of the goddesses who send epilepsy, represented with twisted feet, running eyes, and a stream of blood issuing from her mouth. From the Old-Mexican Codex Vaticanus B.

other sudden attacks ensued. Some of the goddesses were supposed to bring this about by making hideous faces. The patient is described as being seized by cramps, making grimaces, rolling his eyes, suffering from paralysed arms and feet contorted into the shape of spoons, as beating about him with his hands and foaming at the mouth (see illustration on this page).

The young solar god of music, dance, and play, Xochipilli (Prince of Flowers) and Tezcatlipoca (Smoking Mirror) (see front cover), a stellar deity famous for magic powers and especially worshipped in Texcoco, had this in common that they punished the breaking of sexual fasts or the evasion of vows, by inflicting diseases of the genital organs. The texts specify venereal disease, "spotted disease", suppuration of the penis, ulcers in the groin, hæmorrhoids, etc. There was a general tendency to regard Tezcatlipoca as the originator of infectious and incurable diseases, among others of dropsy. The women weavers were all supposed to suffer from venereal disease or from scabies, or from other infectious disorders ; it was assumed that their patron, the young chthonian and lunar goddess of love, Xochiquetzal (Upstanding Flower), who had invented weaving, afflicted them with such evils considered typical of the trade.

It is not, however, the above-mentioned deities who are represented as diseased in the pictographic records but rather—characteristically enough—astrological deities in a state of eclipse and invisibility. The minor god Xolotl-Nanauatzin (Twin-Syphilitic), of whom the legend tells that he jumped into the fire in order to become as the sun, is represented with pathological characteristics: twisted hands and feet, ulcers, and running eyes (see illustration on page 561).

In the Codex Borgia, the solar god of the underworld (night) and the new, *i.e.*, still invisible, moon are also represented with ulcerated hands and feet, the Sun god's buboes being elongated (see illustration on page 560), those of the Moon round.

The god of spring, Xipe Totec (The Flayed One), was held responsible for pustular diseases, festering wounds, scabies, various kinds of sore eyes described as "toad's disease", "chicken disease", "mirror disease", and by other names that cannot be interpreted. Amimitl and Atlaua, gods worshipped by the people of Cuicuilac who cultivated the floating gardens called "chinampas", were said to inflict hæmorrhages from the bowels, diarrhœa, expectoration of phlegm, chronic dry cough, and catarrh. Diseases were not always inflicted by the gods. Wicked sorcerers also sent them into the house by means of ants, frogs, toads, and mice. Finally, illnesses might also be caused by inadvertences to which superstition attached. Thus, a disease resembling hæmorrhoids was said to be caused by inhaling too much of the scent of a certain white flower or by treading on, or urinating over, it.

The sexual sinner represented in Mexican picture-writing as the *tlaelquani* (excrement eater) may be regarded as the image of disease *per se*. He is depicted beside Tlazolteotl, the earth goddess and patron of medicines, who had also some connection with sexual intercourse, or close to Mictlantecutli (Lord of the Abode of the Dead) who reigned over those who died of disease. The pathological symptoms represented, characteristically include such as are con-

Execution of a young man (1, 2) and of a girl (3) for intoxication. Stoning for robbery (4) and for adultery (5). From the post-Columbian Old-Mexican Codex Mendoza.



nected with the digestive organs: the punished sinner is shown sticking out his tongue while urine and fæcal matter gush from penis and anus in streams that flow towards the mouth of the offended god. As a sign of his sinfulness the delinquent was also depicted as eating his own excrement (see illustration on p. 559). The picture of the dead gods in the Codex Borgia shows blood gushing from the mouth of the sinner and black clouds issuing from his anus. Seler has proved that the symbol which was taken for a "*facies hippocratica*" of the *tlaelquani* in some representations should, in the light of certain mythological conceptions, more rightly be regarded as the head of an ape. There can, however, be no doubt that the image of the *tlaelquani* is intended to express the closest combination of sin and disease. Indeed, consciousness of sin was in every way strongly marked in the Aztec character.

This transcendental ætiology of certain

illnesses naturally led to religious ceremonial treatment being sought as a remedy. The sick tried to propitiate the gods who had punished their delinquencies. Families were wont to make offerings before several idols, whenever a member fell ill of no matter what complaint. Sick children were carried to the temple of the Dance god Ixtlilton (one of the manifestations of Tezcatlipoca) and given tlilatl (black water), a drink which was kept in covered jugs within the temple and was supposed to cure them. Patients suffering from the complaints sent by Xochipilli and Tezcatlipoca made vows in connexion with religious festivals while they and their family offered prayers for recovery. It was also to Tezcatlipoca that the long flowery orations held during epidemics were addressed.

In the case of diseases sent by Xipe Totec, the patient sought relief by promising to put on the skin of a sacrificial victim which had first served a priest as ceremonial disguise at the feast of Tlacaxipeualiztli (Flaying of Men) dedicated to that god. In order to preserve children from possession their parents kept them at home during the "unlucky" days. At the season of "Rain 1", maize cakes shaped like butterflies and thunderbolts were offered up in the little temples dedicated to the goddesses, of which one was to be found in each quarter of the city. When the sign "Ape 1" was in the ascendancy, physicians abandoned their patients, saying that they had evidently been incurably afflicted by the Cuateteo. Another astrological day sign connected with the Cuateteo, "House 1", was made the occasion of private sacrifices offered in the home by physicians and midwives.

In the Aztecs' conception of the world and in their ceremonial cult, irrational differentiation was applied not only to disease but also to the dead. Preuss is of opinion that originally the Aztecs knew of only one abode of the dead, the land of the Cloud Serpents, the starry northern sky (identical with the underworld). At a later date, however, the increasingly speculative and complicated turn of Mexican mythology

led to changes in this conception. People came to believe that those who died of disease joined Mictlantecutli, the Lord of Mictlan, the land of the Unhonoured Dead (see illustrations on pages 549 and 559). But those who died of venereal disease, scabies, gout, or dropsy, lepers, and those who were struck by lightning or drowned, went to a kind of earthly paradise, Tlalocan, the land of the Rain god Tlaloc, to whose agency several of these illnesses were attributed. Those who fell in battle as well as the sacrificial victims, to whom the same honours were accorded, were believed to find a home in the eastern heavens, whence they daily accompanied the sun on his march towards the zenith, while the women who died in childbirth, being also regarded as a kind of warriors, were allotted the western heavens, where they welcomed the sinking sun and conducted him to his setting. These differentiations also affected the ceremonial connected with death, inasmuch as future inhabitants of Mictlan were cremated while those destined for Tlalocan were buried. In the case of warriors the cremation was symbolical, only a token bundle of a mummy being consumed by the

The sinner (tlaelquani) with his morbid symptoms : hanging tongue and gushing streams of faecal matter and urine. Below, Mictlantecutli, the God of the Dead. From the Old-Mexican Codex Borgia.



flames (see top of illustration on page 562).

Thus it was the religious outlook of the Aztecs which finally determined their attitude towards disease ; but this by no means precluded the growth of medical science of a rational type. Only the tiniest section of the experimental knowledge garnered by this science can be touched upon in the following and no attention can be paid to the fact that Aztec pharmacology disposed of a large choice of drugs for the treatment of each of the many diseases. For the greater part these drugs have not yet been botanically designated, let alone pharmacologically explained. Dr. Hernandez is said to have mentioned no less than twelve hundred medicinal herbs in the original version of his work. Attention should also be drawn to the frequent dietary prescriptions of the Tlatelolco doctors as reproduced by Sahagun.

The inhalation of pulverized tobacco leaves (*Nicotiana rustica*, Aztec : *picietl*) was supposed to relieve catarrh, especially when combined with massage of the mucous membranes of the mouth. Swollen tonsils were cut with a small, slender knife of obsidian. An ordinary cough was treated with an infusion of wormwood (*iztauyatl*), of which adults drank about a pint while infants were given about a quarter the amount pressed into their mouths in small quantities from a piece of cotton soaked in the decoction. Certain dietary precautions were to be taken at the same time : meat was to be eaten roasted and cooling foods such as fruit or cocoa were to be avoided. A vapour-bath was also recommended. If the patient suffered from a chronic cough with copious expectoration of phlegm, blood, and pus, he was given a thoroughly

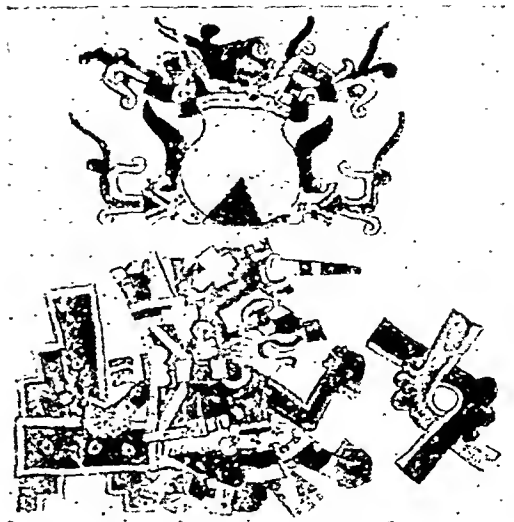
The Sun god of the Nether World (Night) shown with numerous sun-discs, each of which is being cut into. His outstretched hands and feet are covered with sores. (The figure has been outlined in black for the sake of clearness). From the Old-Mexican Codex Borgia.



brewed decoction of *Croton draco* wood (tlapalezquauitl). The same was used for hæmoptysis, for which the doctors also prescribed cocoa spiced with vanilla (tlilxó-chitl), a plant of the pepper tribe (mecaxó-chitl), and a kind of *Capsicum* (chiltecpin), roasted, to which was added the popular medicinal ulli gum (black resin, especially that of the *Castilloa elastica* tree). Normally the well-to-do Aztecs drank their cocoa without any extra flavouring. It was prepared by pounding the cocoa beans, mixing them with cooked maize corn, adding water to the mixture, after some time sieving this and finally letting the liquid fall down from a height into a receptacle so as to make it frothy. Cocoa was also prepared and sold on the market.

A well-known purgative was *Morus rubra* (quautlatlatzin) of which two or three roast fruits were taken at a time. Herbal enemas were also much used. In cases of diarrhœa the patient was told to eat gruel prepared from the seeds of chiantzotzotl, a plant of the family Scrophulariaceæ, and porridge made of *Salvia chia* grains. If this had not the desired effect, the doctor administered as an enema or by mouth a dose of warmed yellow axin ointment made of boiled and pressed cochineal (*Coccus cacti*). Dieting in this case consisted in avoiding meat, eating boiled or grilled maize cakes, and drinking cocoa made with lime water and roast pepper (*Capsicum*, Aztec : chilli). In cases of bladder trouble an enema prepared from ground batata root (*Ipomœa batatas*, Aztec : cacamotic) was considered useful as also a diuretic decoction of powdered opossum tail (*Didelphys*, Aztec : tlaquatzin).

Eating a humming-bird was recommended as a prophylactic against syphilis. (This bird, incidentally, in winter was said to hang on to a tree by its beak, in a shrivelled state.) The cure was effected at the cost of sterility. For the rest, the Mexicans distinguished two kinds of bubo: first, filthy "large boils" (tlacazol-nanauatl) and, second, less repulsive but very painful "little boils" (tecpil-nanauatl) which lamed the hands and feet and ate into the bones. When the



The "syphilitic" god Xolotl-Nanauatzin represented with twisted limbs, sores, and running eyes. Above he is shown burning himself in a jar. From the Old-Mexican Codex Borgia.

boils burst the patient was made to eat maize pap to which a kind of *Chenopodium* corn (michiuautil) was added or partook of an infusion prepared from oleander root (*Nerium oleander*, Aztec : quautepatli) three or four times a day. This was preceded by a very hot bath. Syphilitic pseudo-paralysis was treated by blood-letting.

Chewing-gum (tzictli), made of bitumen (chapopotli) and yellow axin ointment, was considered necessary for the care of the teeth, which were cleaned with wooden picks after every meal. The gum was chewed in retirement ; only courtesans chewed in public. When people suffered from sore eyes, the doctor ordered purgatives, hair-washing, and blood-letting. Certain much used eye-drops were composed of agave wine left standing in the open overnight, of poppy seed oil taken from *Argemone mexicana* (chicalotl) and of juice pressed from the buds of the mezquite tree (*Prosopis* sp. of the N. O. Leguminosæ, Aztec : mizquitl).

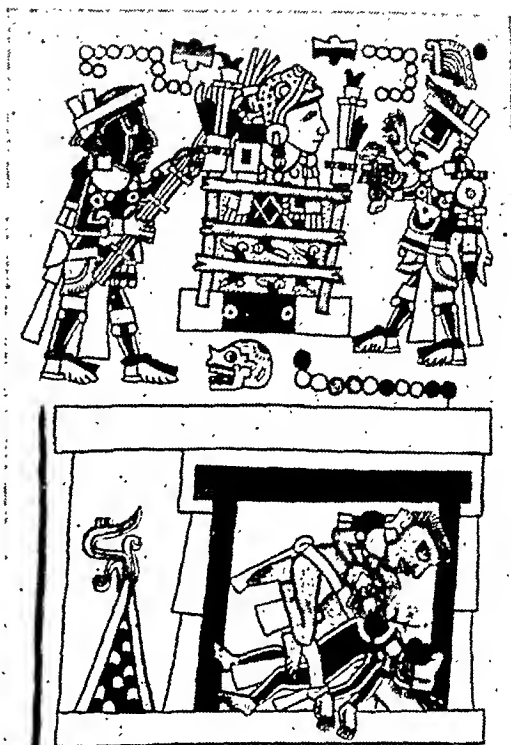
Powdered obsidian (volcanic glass ; Aztec : itztetl) was supposed to make new wounds heal without festering. Another excellent remedy for wounds was said to be the juice of young agave leaves baked in ashes. Cut

lips and noses were stitched with human hair. Mexican surgeons were versed in rhinoplasty; badly scarred lips were cut a second time, burnt, and resewn. Where the skull was fractured the surgeon adjusted the edges with the aid of a delicate bone instrument and used agave juice to promote the setting. Trepanning is not mentioned by Sahagun. Broken bones were pulled into place, powdered with ground dahlia root (acocotli) and prickly pear (*Opuntia ficus*, Aztec : nopalli) and bandaged with a splint. The patient was recommended to drink agave wine and take baths. If the bone refused to set, the surgeon scraped the line of fracture and introduced a splinter taken from the resinous stone-pine (ocotl) into the marrow of the bone to give it support.

In cases of gout, a plaster made of powdered obsidian and white of egg was supposed to alleviate the pain. Yellow axin ointment was much used for frostbite. Resinous poultices were supposed to be good for all affections of the outer and inner organs, especially in cases of chill. These poultices were prepared by taking a piece of chamois leather and repeatedly spreading on its inside surface a liquid paste of melted rubber, chiefly composed of black ulli gum to which were added bitumen and white copal resin yielded by *Anacardiaceæ* plants such as terebinths, and by *Leguminosæ*. When the leather was completely saturated an extra layer was added and a piece of thin cotton stitched over it. The poultice was applied with the cotton next the skin.

A strange aphrodisiac against which young people were warned because malignant witches had a way of mixing it with people's food, consisted of the flesh of a small horned serpent (*mazacouatl*). Too large a dose was supposed to produce continuous ejaculations terminating in death. The flesh of the jaguar, on the other hand, was considered a sexual sedative.

Rationally speaking, the use of amulets is diametrically opposed to the therapeutics touched upon in the foregoing. The Spanish testimonies to cures effected by amulets are, however, sufficiently remarkable to deserve



Above : cremation. Below : human sacrifice. From the Old-Mexican Codex Nuttall.

mention. For making amulets, the Mexicans used especially such stones as possessed outward peculiarities to support the assumption of hidden properties. There was, for instance, a transparent white stone with red spots which mothers wore over the breast in the hopes of increasing their supply of milk. Or then there was a green stone with white speckles which was worked into fishes, birds' heads, balls, etc., and worn round the neck, arms or waist in order to counteract kidney trouble. (The cures attested by Dr. Monardes were mentioned on page 543.) A darkish jasper with red speckles was cut into heart-shaped pieces and worn round the wrist or neck as a remedy for all kinds of hæmorrhages. This "blood stone" was also used in powdered form for the treatment of wounds. The Spaniards also experimented with it, Dr. Monardes unsuccessfully. Fr. Sahagun tells us that during the typhus-like epidemic of 1576, when so many died from bleeding of the nose, the "blood stone"

proved most efficacious ; and that it sufficed if the patient held it in his hand.

It can be seen from the above that with the Aztecs, as with all peoples, medicine was really based upon a widely ramified complex of rational and irrational attitudes towards the phenomenon of disease ; with this difference, of course, that a nation belonging as did the Aztecs to one of the advanced ancient civilizations was bound to attain to effective specialization and to improve medical science and practice in a high degree while at the same time evolving magical and religious theories and building up a highly complicated ceremonial. That this was the case with the Aztecs has been clearly shown. Their therapeutics differed from those of primitive races only in degree of efficiency. Ethnologists have in the course of historical research established beyond a doubt that the oldest known cultures used irrational curative methods side by side with procedures that must be considered entirely rational in the modern medical sense of the term. The conclusion in the case of the Aztecs is that neither did medicine originally spring from magic and at a later date lapse into a secular science nor did sober judgment based upon experience gradually give way to superstitious delusions. The history of civilization teaches its students to recognize ever more clearly that the two attitudes are coexistent, not only in practice but even in principle, both attitudes being rooted in the very nature of man.

In order to make this more explicit one

may but point out to all the instinctive activities of the living human being—whether in the material or in the spiritual sphere—and to the changing but compulsive interpretations he puts upon his own actions and their objects from the very beginning. Even where there exists a perfectly rational art of healing, based upon the first spontaneous movement to touch the aching spot and upon a practical knowledge of effective herbs, the human mind will still tend to create for itself a more or less irrational idea of the disease. Wound-dressing, massage, blood-letting and purgings by no means preclude a concomitant aetiology which attributes the evil to the presence of palpable extraneous matter or of a spirit which must be expelled from the body. In cases of possession, magic treatment follows automatically and in some cultures may be perfected into a really remarkable technique of suggestion. It is a fact that the American Indian seeks to cure himself by drawing on his wide (rational) experience and has recourse to the medicine-man only when mental depressions prevent his admitting any but irrational interpretations. Both magic medicine and rational medicine originate in the human mind, which in the former case seeks a more “imaginative”, in the latter a more practical and experimental interpretation of pathological phenomena ; both show an increasing development, the lines of which cross and recross in the course of history until, in recent times, one of them would seem to be disappearing almost completely.

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Tablets (0.25 g)—Tubes of 20 and Bottles of 100

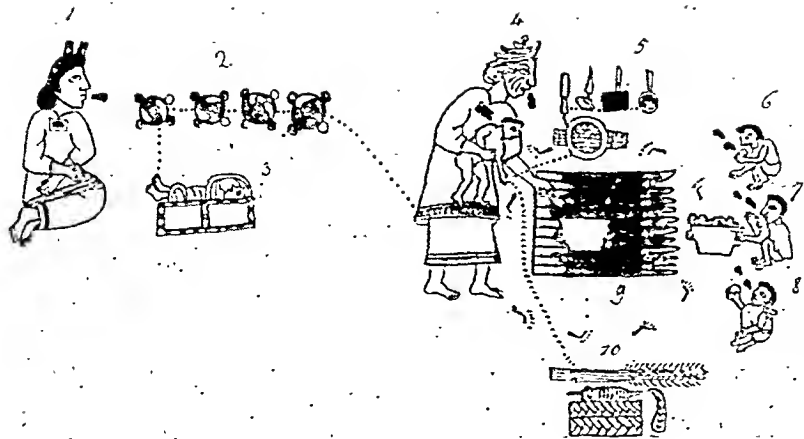
The ancient American Indians could boast some remarkable achievements in obstetrics. The Aztecs tell of a typical hunting tribe in the highlands of northern Mexico, living under the inexorable law of the march and applying only the most expeditious of healing methods: an arrow in the neck for lingering invalids or for the aged and infirm. These Teochichimeca, they say, warmed the backs of pregnant women and then poured water on them, a procedure based on the same principle as the more civilized vapour-baths which the Aztec midwives used copiously. We are also told that the wild hunters administered kicks to the mother in order to still the flow of blood after her confinement and then resumed their march. It must be allowed that the midwifery of the southern cities compares favourably with such methods.

When an Aztec woman of position reached

her fifth month of pregnancy, the older generation of the family called in a midwife (*ciuatl temixiuitl*) under whose care—and with the protection of *Tlazolteotl*, the patron goddess of baths and medicine—she then betook herself to the baths. If the midwife ascertained that the child was badly placed, she massaged her patient during and after the bath. The customary lashing with maize leaves was sometimes omitted in the case of expectant mothers. Care was also taken to reduce the temperature “so that the child might not cleave to the womb”, as the Aztecs put it. Numerous precautions were considered proper for a pregnant woman. She was never to fast, but to partake plentifully of well-prepared food. (The figure of speech for such a diet was “washing the infant’s feet”.) She was forbidden to work much, to lift heavy weights, or to run—it is easy to see that the prescriptions apply to a

Old-Mexican Midwifery: (1) Vapour-bath with entrance-door and furnace from which smoke is rising, represented between two hills on which priests are sitting; (2) shows a woman having just brought forth a child to which she is still attached by the navel-string. Her abdomen lies in folds, the placenta has not yet been removed; (3) shows the young mother crawling once more into the vapour-bath in the interior of which (4) she is placed beneath a snail (the symbol of birth) and watched by a priestess and four priests. From the Old-Mexican Codex Nuttall.





Aztec Midwifery : a mother (1) who has borne four children (2) is squatting beside a baby in its cradle (3). The old midwife (4) is washing the fourth child. The vessel filled with water is placed on a rush mat. (9). The three other children (6, 7, 8) are eating. A group of objects (5), among others, buckler and arrows, symbolize the boys' attributes, another group including a spindle (10) stands for the girls' attributes. From the post-Columbian Codex Mendoza.

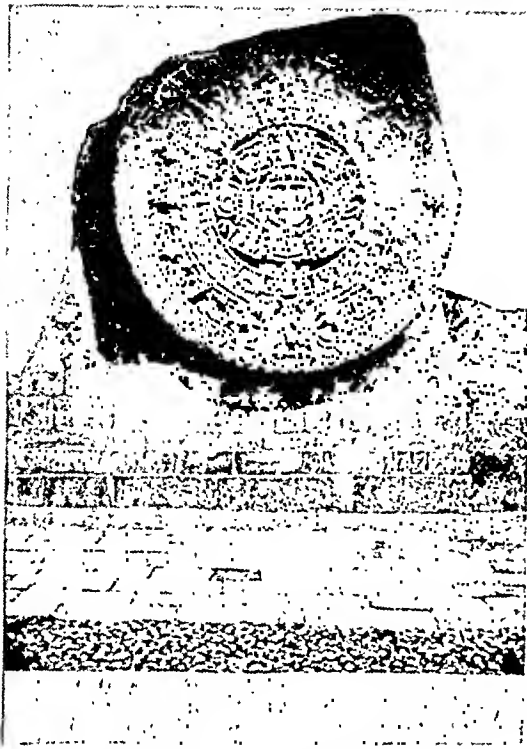
well-to-do woman in a civilized community—and every kind of shock was to be avoided so as to eliminate the risk of a miscarriage. Other advice was founded on superstition. The expectant mother was to take care not to warm herself too much in the sun or at the fire for fear of giving the child a misshapen face. All her wishes were to be fulfilled lest the child should suffer harm. She was not to look at anything red ; if she did, she risked a lateral presentation. Numerous similar fears were current respecting the influence of portents upon the child. Midwives advised expectant mothers to continue cohabitation in a limited degree even after the third month of pregnancy, as total abstinence would have a weakening effect upon the child. For some time before the lying-in, strict continence was to be observed.

Shortly before the expected event, the midwife grew more assiduous in her care and came to live in the house. Sometimes there were even several midwives in attendance. When the woman's labour began, the midwife took over the housekeeping. She also washed the patient's body and hair ; when the labour-pains increased, a vapour-bath was judged expedient. Afterward, oxytocic medicines were administered : a potion prepared from the powdered root of the composite " ciuapatli " (Woman's Medicine, *Eriocoma* ?) and some time later half a finger's length of powdered opossum tail (*Didelphys*, Aztec : *tlauatzin*). This remedy was supposed to be exceptionally effective ;

it was said that a whole tail would expel all the intestines.

As soon as the infant was born, the midwife raised a war-cry, for a woman in labour received the same honours as a warrior who had taken a prisoner. She then cut the umbilical cord and some time later buried the placenta in a corner of the house. She washed the new-born infant while murmuring prayers to the goddess of flowing water, Chalchiutlicue (She of the Jewelled Skirt) (see illustration on page 551). First the midwife blew on the water, then she gave the infant one drop to taste, then moistened its chest, head, and the nape of its neck, and finally immersed it ; after the bath she swaddled it (see above illustration and that on page 564). Immediately after the bath, the calendar augur was consulted with regard to the horoscope of the newly-born.

The efficiency of the Aztec midwives was particularly apparent when complications arose. If there was difficulty in expelling the child even after a dose of the strong oxytocic of opossum tail ground together with grains of *Salvia chia* (Aztec : *chian*) and mixed with water, the midwife took her patient by the head and shook it, made her sit up and beat her back with hands and feet. The woman in labour was called upon to make an effort on her part to expel the child. If all failed, the mother was transported to a bath-house and massaged in the hopes of improving the position of the child. The midwife's last resource was a prayer to the goddess *Ciuacoatl*, who



The Aztec "Calendar Stone", National Museum of Mexico, Mexico City, D.F.

was supposed to have been the first woman to bear a child (many clay figurines were made of her with a child in her arms), and to Tlazolteotl and other deities. As soon, however, as an experienced midwife knew from the cessation of movement in the womb that the child was dead, she proceeded, with the parents' permission, to a last surgical attempt to save at least the mother's life. With her hand she introduced an obsidian knife into the uterus, carefully cut up the foetus, and drew it forth in pieces.

If in spite of every medical aid a woman died in childbirth, she was, according to the beliefs of the Aztecs, transformed into a "mociaquetzqui" (Woman Who Ascends) and like a warrior went to heaven, her apportioned station being in the west, where she escorted the setting sun. She was thenceforth regarded as one of those dangerous goddesses, the Ciuateteo (Divine Women), and was buried in one of the temples dedicated to them, which were to be found in each quarter of the city, her husband carrying her dead body across his shoulders like that of a warrior. The funeral was followed

by all the older midwives, armed with shields and obsidian swords, and shouting their battle-cry like soldiers at the sight of the enemy. It was their function to keep off the sorcerers, who might try to steal the dead woman's left arm for magical and hypnotic purposes (cf. page 551).

As soon as the delivery was complete the augur appeared on the scene to predict the infant's future from the calendar. The great part played in the life of the Aztecs by their calendar has been mentioned repeatedly. In this connection, a few words are in place on the Aztec Calendar Stone, that large disc in the Mexico National Museum which so well reflects the ancient Mexican conception of the world as related to time and space. The famous relief is cut in a great block of porphyry, is over eleven feet in diameter and formerly stood within the wide temple precincts of Mexico City. The disc is in all probability an uncompleted sacrificial stone intended to receive the victims' blood. The face in the centre represents the Sun god, Tonatiuh (Travelling Warmth). It is planted in the middle of the year symbol for the present Fifth Cycle in the world's history: "4 Movement." Upon the four branches of the same hieroglyph—which correspond to the four cardinal points—the sculptor has superimposed the year symbols of the four preceding cycles and surrounded them by rectangular frames. Beginning at the right-hand top corner and proceeding anti-clockwise one has: 4 Jaguar (Earth); 4 Wind; 4 (Fire)-Rain, and 4 Water, indicating the catastrophes by which each of the cycles was brought to an end. This cosmogonic central image is surrounded by a circular band containing glyphs which represent the twenty day-signs of the Mexican "month". This arrangement is followed by another concentric, ornamental band with stylized sun's rays in the form of arrow-heads pointing outward. The outer ring of the disc is formed of two fire serpents surrounded by flames. In their open mouths, turned towards each other at the bottom of the disc, we see two human heads. That on the right represents the Fire god, that on the left the Sun god.

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Ciba Zeitschrift

Basel, März 1939

6. Jahrgang

Nummer 67



HEIL- KUNST IN DER VORZEIT

Kampf- und Jagdszenen aus dem jüngeren Paläolithikum. Auf dem Bilde sind Bogenschützen erkennbar. Die durch Pfeilschüsse verursachten Wunden stellten erhebliche Anforderungen an das Können des Chirurgen der Steinzeit. Detail der Felsmalereien von Minateda (Spanien). Nach H. Breuil.

Bei
spastisch bedingten
Schmerzzuständen
Spasmo-Cibalgin

Ciba Zeitschrift

März 1939

6. Jahrgang

Nummer 67

INHALT: HEILKUNST IN DER VORZEIT

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Nachdruck, auch teilweiser, sowie Übersetzungen, nur
mit Genehmigung der Redaktion der Ciba Zeitschrift gestattet

Übersichtstabelle zur Heilkunst in der Vorzeit

Archäologische Gliederung	Geologische Gliederung	Menschenformen	Kulturelemente — Medizinische Kenntnisse und Verfahren	Zeit annähernd in Jahren v. Chr.
Eolithikum	Miocän (Tertiär)	Anthropoide der Steppe	Halbaufrechtes Gehen; Wesensänderung durch Anpassung an das Leben in der Steppe.	
Archäolithikum	Pliocän (Tertiär)	Hominide Formen	Anfänge von Sprache, Bewußtsein und «Wahlhandlungen»; tierische Heilbestrebungen werden Formen des gegenseitigen Beistandes.	
Älteres Paläolithikum				
Archäo-Paläolithikum	Übergang zum Quartär		Feuer als Schutz und Heilmittel?	
Præchelléen	1. Inter-glazialzeit	Homo Heidelbergensis	Älteste Knochenkultur. Gegenseitiger medizinischer Beistand unter Verwendung von Werkzeugen, die seit dem Archäolithikum vorhanden sind. Flächenhafte Körperbemalung.	700 000 bis 400 000
Chelléen				400 000
Acheuléen	3. Inter-glazialzeit Riß-(Würm)	Neanderthal-Rasse	Fellbereitung. Instrumente zum Schaben, Kratzen, Stechen auch zu medizinischen Zwecken verwendet. Medizinisches Leitmotiv: Fremdkörpervorstellung, Contraria contrariis.	
Moustérien	1. Würm-Eiszeit		Lineare Körperbemalung? Initiationsriten? Zahnausschlagen? Kannibalismus. Anfänge der Organotherapie: Similia similibus. Magisches Weltbild.	240 000 bis 100 000
Jüngeres Paläolithikum				
Aurignacien	2. Würm-Eiszeit	Aurignac-(Brünn-) Rasse vorherrschend. Grimaldi-Rasse	Alteuropa: Speerschleuder, Dolch, Lorbeerblattspitzen. Amputation von Fingern, Harnröhrenverschluß? Asien, Nordafrika (Ägypten): Beschneidung?	
Solutréen		Cro-Magnon-Rasse vorherrschend.	Messerartige Mikrolithen, Knochennadeln mit Ohr, Wundnaht? Wundverbände (vereinzelt vermutlich schon früher).	
Magdalénien		Chancelade-Rasse.		

Archäologische Gliederung	Geologische Gliederung	Menschenformen	Kulturelemente — Medizinische Kenntnisse und Verfahren	Zeit annähernd in Jahren v. Chr.
Mesolithikum = Frühneolithikum = Epipaläolithikum Tardenoisien Azilien Maglemose-Kultur Campignien (Kjökenmøddinger) Pfahlbaukultur Walzenbeilkultur Sibirische Knochenkultur Arkto-baltische Kulturen	Nacheiszeit und Alluvium	Mediterrane Rasse	Pfeil und Bogen. Mikrolithen. Entwicklung der Chirurgie. Aderlaßbogen?	18 000 bis 5 000
Neolithikum Bandkeramik (Tripolje, Dimini) Megalithische Kultur (Almeria, Spanien; Long Barrows, England), Schnurkeramische Kultur Glockenbecherkultur, Spätmegalithische Kultur (El Argar, Spanien) Aunjetitzer Kultur Kupferzeit Lausitzer Kultur Bronzezeit Nordische Bronze-kultur Eisenzeit Hallstatt-Kultur La-Tène-Kultur		Alpine Rasse	Steinkeulen, Rasiermesser aus Stein. Animismus. Schneebrille? Kastration. Ohrdurchbohrung (vermutlich auch schon früher).	
		Nordische Rasse in Europa	Kronenbohrer. Stempel zur Körperbemalung, Tatauierung. Schleuder. Trepanation, T-Sincipital (Frankreich, Kanarische Inseln). Kaiserschnitt an der Toten, vereinzelt an der Lebenden? Zahnfeilung. Kopfdeformierung. Schröpfkopf?	2 500
			Toilettegeräte aus Metall (kleine Zangen, Pinzetten, Nadeln, Rasiermesser). Fassung von Quellen. Bestrafung durch Abhacken von Gliedern, Augenausstechen (Starstich).	1500 500

Unter Benützung einer Tabelle von E. Frb. von Eikstedt, zusammengestellt von Dr. Reinhard Hofschlaeger

Vorbemerkung. Die Heilkunst in der Vorzeit ist ein Gebiet menschlicher Kultur, das weder durch geschriebene Dokumente noch durch mündliche Überlieferung zugänglich ist. Sie kann erschlossen werden durch Funde aus der Vorzeit und durch Folgerungen aus Verhältnissen, die sich bei Naturvölkern finden oder vom Altertum her bekannt sind. Aus diesen Gründen ist es berechtigt, wenn in den Aufsätzen dieser Nummer hie und da auch Beispiele aus Zeitabschnitten herangezogen werden, die nicht zur Vorzeit zu rechnen sind, wie das frühe Mittelalter, die frühnubische Zeit usw.

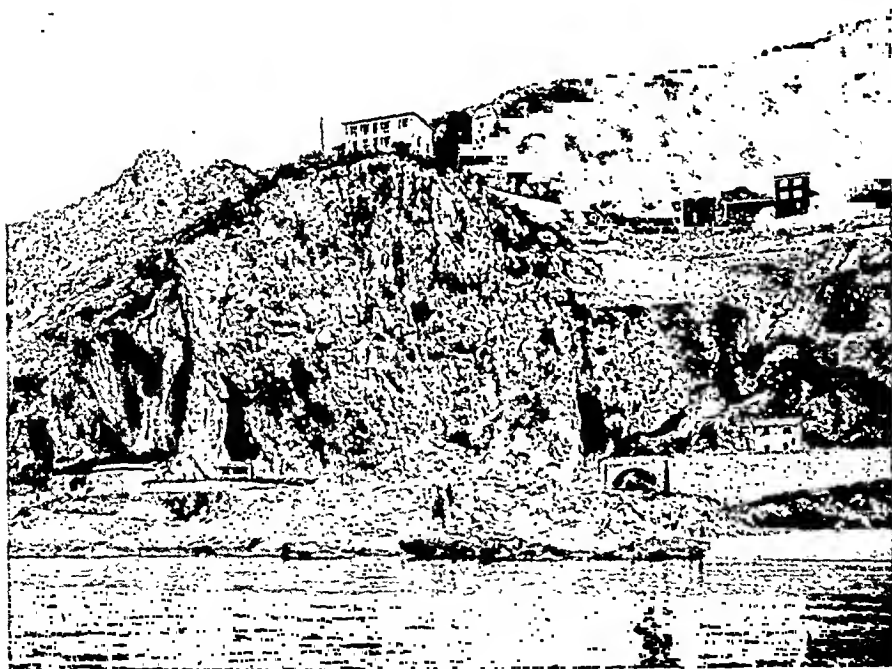
Auf diese Art gewonnene Einsichten und Ergebnisse müssen bis zu einem gewissen Grade hypothetischen Charakter haben. Dem durch seine Arbeiten auf vorgeschichtlichem Gebiet bekannten Verfasser dieser Nummer dürfte es gelungen sein, das richtige Verhältnis zwischen gesichertem Ergebnis und wohlbe gründeter Vermutung zu wahren.

Die Redaktion

Im Jahre 1856 wurden im Neanderthal zwischen Düsseldorf und Elberfeld beim Abbau einer Felsgrotte menschliche Knochenreste gefunden. Dies wurde der Anlaß, daß die bisher mehr auf philosophischen Spekulationen beruhende Anthropologie einen na-

turwissenschaftlichen Unterbau erhielt und damit auch selbst zu einer naturwissenschaftlichen Disziplin wurde. In einer großen Zahl von Abhandlungen wurde die Stellung des Menschen in der Natur erörtert, und namentlich durch Schwalbes Arbeiten über den «*Pithecanthropus erectus*» setzte in den 90er Jahren des vorigen Jahrhunderts in der Anthropologie eine Periode eingehender Forschungsarbeit ein.

Ist der Mensch, wie G. Schwalbe (1844 bis 1917) und andere Anthropologen annehmen, in der Mitte oder gegen Ende des Tertiärs von der den Anthropoiden (Menschenaffen) und Menschen gemeinsamen Stammlinie abgezweigt, so muß es Skelettreste geben, von denen kaum ausgesagt werden kann, ob sie anthropoid oder menschlich sind. Tatsächlich können die wenigen Knochenfunde vom Ende des Tertiärs oder aus dem unteren Diluvium verschieden gedeutet werden, und es liegt, wie H. Weinert mit Recht betont, in der Sache selbst begründet, daß das Urteil der Fachleute über das «missing link» zwischen Menschenaffen und Mensch verschieden ausfällt. Zu diesen nicht eindeutig bestimmaren Funden gehört das von Eugen Dubois systematisch gesuchte und 1891/92 bei Trinil auf Java gefundene Zwischenglied zwischen Mensch und Tier, der *Pithecanthropus erectus*.

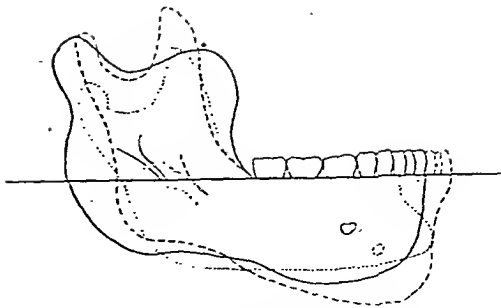


Die Grotten von Grimaldi bei Mentone, eine Wohnstätte des paläolithischen Menschen. Hier fanden sich neben Skeletten vom Cro-Magnon-Typus auch solche von negroidem Habitus. Nach «Les Grottes de Grimaldi». Monaco 1910.



Schädeldeck des von E. Dubois bei Trinil auf Java gefundenen *Pithecanthropus erectus*. Nach E. Dubois.

Es handelt sich bei diesem Fund um ein flachgeneigtes und nur wenig gekrümmtes Schädeldach (s. obenstehende Abb.), um einige Backenzähne und einen Oberschenkel, der 15 m vom Schädel entfernt lag. Schwalbe hält die Knochen von Trinil für Reste eines Wesens, das eine Zwischenstellung einnimmt zwischen *Homo primigenius* (Neanderthaler, mittleres Diluvium) und Affenformen, wie sie heute durch den Schimpansen vertreten werden. Die gleichzeitige Existenz von Mensch und *Pithecanthropus* ist nach Schwalbe nicht erwiesen. Manche Forscher sehen den im Jahre 1920 von J. G. Anderson in einer Höhle bei Chou-Kou-Tien (40 km SW Peking) gemachten Fund menschlicher Zähne, eines Unterkiefers mit schwacher Kinnbildung und anderer Bruchstücke von Schädeln, als Überreste eines Frühmenschen (*Sinanthropus pekinensis*) aus dem Übergangszeitalter Tertiär-Diluvium an, dem auch der *Pithecanthropus erectus* angehöre; nach anderer Beurteilung ist der *Sinanthropus* aber jünger.



Kieferdiagramme verschiedener Menschentypen: ausgezogene Linie = *Homo Heidelbergensis*, fein gestrichelt = recenter Europäer, gestrichelt = Neger. Nach O. Schoetensack.

Der älteste Knochenrest, der mit Sicherheit als menschlich bezeichnet werden darf, ist der 1907 gefundene und von Otto Schoetensack (1850–1912) beschriebene Unterkiefer von Mauer bei Heidelberg, der vermutlich der ersten Zwischeneiszeit entstammt (s. untenstehende Abb.). Schoetensack gab dem durch diesen Unterkiefer charakterisierten Menschentyp die Bezeichnung «*Homo Heidelbergensis*». Auffällig ist an diesem Unterkiefer die massige Entwicklung und die Dicke des Kieferkörpers, sowie das gänzliche Fehlen eines Kinnvorsprunges. Mächtigkeit, Höhe und Dicke des Kieferkörpers sind derartig, daß man an der menschlichen Herkunft zweifeln könnte, wenn nicht die Beschaffenheit der Zähne jeden Zweifel an seiner Zugehörigkeit zur Gattung «Mensch» ausschließen würde. Der «Heidelberg-Mensch» kann als «Präneanderthaler», d. h. als ein Vorläufer der Neanderthal-Rasse bezeichnet werden. Die Stellung des *Homo Heidelbergensis* als der ältesten Men-

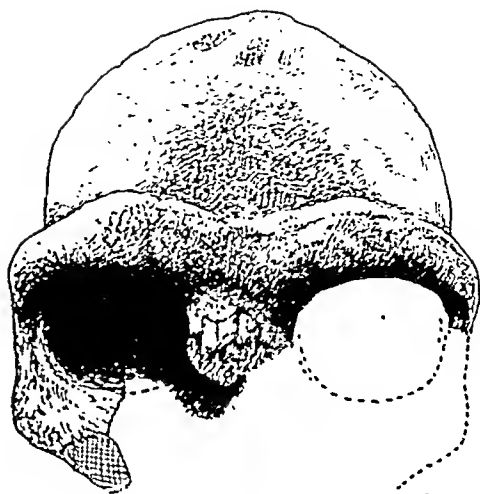


Unterkiefer des *Homo Heidelbergensis* (rechte Hälfte). Bemerkenswert ist der massige Bau des Kiefers und das Fehlen eines Kinnvorsprunges. Nach O. Schoetensack.

schenform ist aber auf andere Weise gesichert. Der Unterkiefer stammt aus altdiluvialen Kiesen. Gleichaltrige Schichten finden sich in den Mosbacher Sanden bei Mainz, aus denen O. Schmidtgen eine Reihe von Knochenwerkzeugen ausgegraben hat, die Spuren menschlicher Bearbeitung und menschlicher Benutzung aufweisen und darum Beweisstücke für die Anwesenheit des Menschen zu jener Zeit sind (s. untenstehende Abbildung). Dasselbe Alter (erste Zwischeneiszeit) wie die erwähnten Schichten haben auch die Schichten von Wangen a. d. Unstrut, die ebenfalls Paläolithfunde lieferten. Diese Artefakte gehören nach R. Lehmann zu den ältesten in Deutschland.

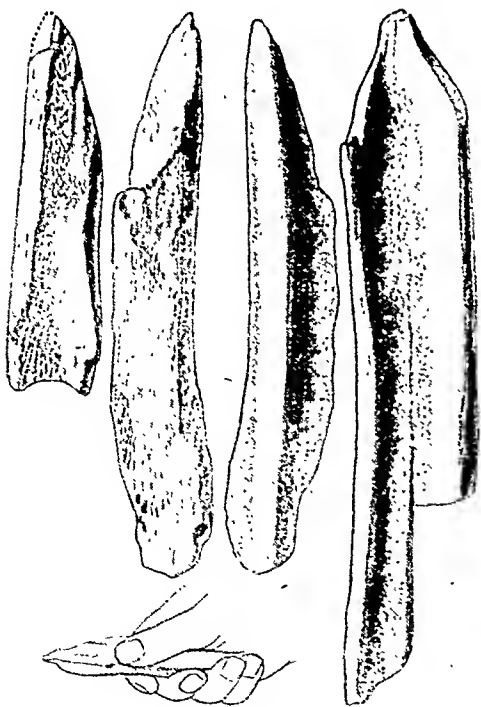
Das erste Licht in die Vorgeschichte des Menschen brachte aber die schon genannte Entdeckung des Neanderthal-Skelettes im Jahre 1856. Die Auffassung von J. C. Fuhlrott (1804–1877) und Hermann Schaaffhausen (1816–1893), daß die gefundenen Gebeine, nämlich die Hirnschale, beide Oberschenkelknochen, der rechte Oberarmknochen mit Speiche, der linke Oberarmknochen mit abgebrochenem Kopfe, der linke Ellbogen, ein Bruchstück des rechten Schulterblattes, das fast vollständig erhaltene rechte Schlüssel-

Knochenwerkzeuge aus den Mosbacher Sanden bei Mainz; sie entstammen den gleichen altdiluvialen Schichten wie die Reste des Homo Heidelbergensis. Nach O. Schmidtgen.



Der sogenannte «Galiläa-Schädel» von Tabgha am See Genezareth, durch den das Vorkommen der Neanderthal-Rasse im rorderen Orient belegt wird. Nach F. Wiegers.

bein, die fast vollständig erhaltene Hälfte des Beckens und fünf Rippenbruchstücke, aus der Diluvialperiode stammten, fand keine allgemeine Zustimmung, zumal Rudolf Virchow (1821–1902) sein Urteil dahin abgegeben hatte, es handle sich um einen krankhaft veränderten Menschen der gegenwärtig lebenden Rasse. Allgemein richtig beurteilt wurde der Neanderthal-Fund erst, als man seit 1887 in Belgien, Südfrankreich und bei Weimar ähnliche Menschenknochen zusammen mit Skeletten eiszeitlicher Tiere fand. Die Neanderthal-Rasse, deren Verbreitung man heute auf Grund von Funden in Spanien (Gibraltar), Italien, Frankreich, Belgien, Kroatien, im Kaukasus, in Mesopotamien, Palästina («Galiläa-Schädel» von Tabgha am See Genezareth, s. obenstehende Abb.) und vielleicht auch von solchen in Afrika festlegen kann, zeigt in allen ihren Vertretern als auffallendstes Charakteristikum einen sehr plumpen Knochenbau. Der Schädel des Neanderthalers, ein breiter Langkopf, wirkt grob. Die niedrige Gehirnkapsel läuft in mächtige Augenbrauenwülste aus, das Gesichtsskelett ist groß und unförmig, die Augenhöhlen sind rund, die Nase ist breit, und das Kinn fehlt. Bei manchen Schädeln, wie dem des Homo mousteriensis, dem Typ eines Neanderthalers, der nach dem Fundort Le Moustier (Dordogne) benannt wurde, springt der untere Gesichtsteil schnauzenartig vor (Prognathie). Der Oberschenkelknochen ist schwer und klobig; sein Schaft ist nach vorn durchgebogen, der Gelenkkopf ist groß und

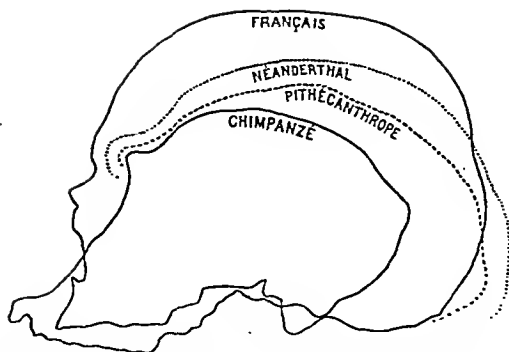
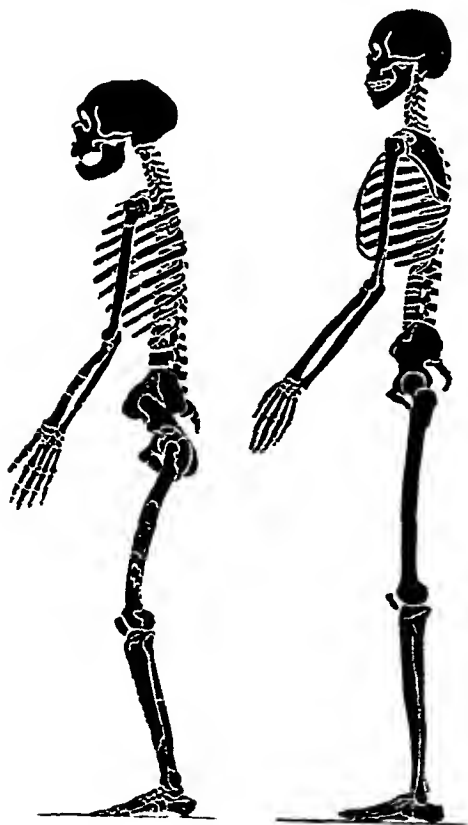


dick. Die Oberschenkelkrümmung, die sich bei primitiven Rassen häufiger und embryonal auch beim heutigen Menschen findet, bringt Weinert in Zusammenhang mit der bei primitiven Menschen üblichen hockenden Sitzweise. Die Schneidezähne der Neanderthaler stehen aufeinander, oder die oberen stehen vor denen des Unterkiefers. Die schon erwähnte Prognathie wird daher durch das Vorstehen der Kiefer bedingt, nicht durch die Stellung der Zähne. Die Eckzähne sind von ausgesprochen menschlichem Typus.

Die Körpergröße der Neanderthaler, die einen halbaufrechten Gang hatten und im Besitz der Sprache waren, blieb unter dem Mittel der heute lebenden Menschen, sie betrug etwa 160 cm; auf ziemlich kurzen Unterschenkeln saß ein untersetzter Körper, die Muskelkraft war vermutlich bedeutend.

Die Beurteilung des Neanderthal-Menschen ist heute ziemlich einheitlich und kaum noch

Rekonstruiertes Skelett eines Neanderthalers von La Chapelle-aux-Saints. Als Vergleich dazu das Skelett eines rezenten Menschen (Australier). Nach M. Boule.



Schädelprofile des Schimpansen, des Pithecanthropus, des Neanderthalers und des heutigen Europäers. Nach M. Boule.

umstritten (W. Gieseler). Pithecanthropus, Homo primigenius, Homo sapiens sind nach Schwalbe Glieder einer Familie, der Homiiden, die sich von den jetzt lebenden Menschenaffen durch wahre Bipedie unterscheiden. Weinert tritt der Ansicht entgegen, daß der Neanderthal-Mensch aus der Vorfahrenreihe des heutigen Menschen auszuschließen sei. E. von Eikstedt bezeichnet den Neanderthal als eine «Randform»: die interglaziale fossile Hominidenform, die man hauptsächlich aus Funden in Europa kennt. Nach v. Eikstedt zeigt sich schon im Diluvium ein starker Typenzerfall, und lassen sich schon in jener Epoche Rassen und Rassenkreise erkennen.

So unterscheidet er unter den Europäern des frühen Jungpaläolithikums vier Körperformgruppen: zwei große und weitverbreitete, die primitivere Aurignac- oder Brunn-Rasse und die schon hochspezialisierte Cromagnon-Rasse, sowie zwei nur isoliert auftretende Gruppen, nämlich die negroide Grimaldi- und die eskimoide Chancelade-Rasse.

Die erste Gewißheit, daß während der Eiszeit in Mitteleuropa nicht eine, sondern verschiedene Menschenrassen gelebt haben, brachte die Entdeckung des in der Chronologie der Vorzeit einwandfrei festgelegten Skelettes aus der Halbhöhle von Combe-Capelle (Dordogne). Dieser Aurignac-Mensch (Homo Aurignacensis Hausen), wie H. Klaatsch ihn wegen der Übereinstimmung der bei ihm gefundenen Steinwerkzeuge mit denen von Aurignac, einem südfranzösischen Fundort, nannte, zeigt einen anderen Skelettbau als der Neanderthaler, von dem er sich in der Größe nicht sehr unterscheidet. Der Aurignacmensch besitzt zwar nicht die großen runden Augenhöhlen, nicht den weiten Abstand der Augen voneinander, nicht die breite Nasen-

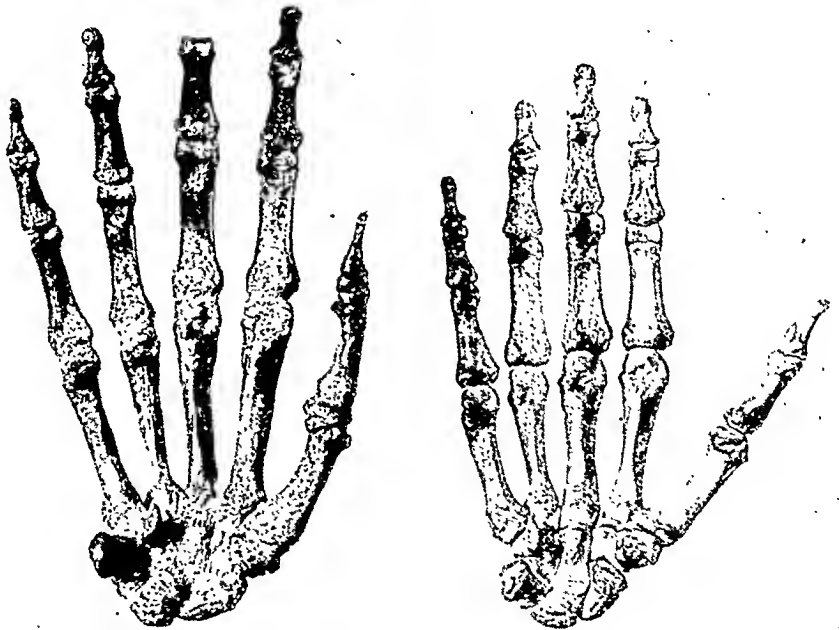


Schädel des *Homo Aurignacensis* Hauseri aus dem unteren Aurignacien von Combe-Capelle bei Montferrand (Périgord), der große Ähnlichkeit mit dem des heutigen Australiers zeigt, von der Seite (*Norma lateralis dextra*). Nach H. Klaatsch und O. Hauser.

öffnung wie der Neanderthaler; aber seine Stirn ist noch niedrig. Das Profil des Aurignac-Menschen (s. obenstehende Abb.) ist geradkiefrig (orthognath), die Schnauzenbildung (Prognathie) ist verschwunden, die Zähne gleichen denen des rezenten Menschen, ihre Pulpahöhlen sind weniger weit als die des Neanderthalers, der Unterkiefer ist in Astbreite und Kinnform primitiv, aber nicht primitiver als beim Australier, der gewissermaßen den noch lebenden Vetter des Aurignac-Menschen darstellt.

Die Gliedmaßen des *Homo Aurignacensis* sind auffallend schlank, die Gelenkenden klein, der Radius gerade (Klaatsch, Weinert, v. Eikstedt). Klaatsch wies durch genaue Vergleiche der beiden Skelettformen nach, daß die Neanderthaler und die Aurignac-Menschen zwei völlig verschiedenen Rassen angehören, die sich feindlich gegenüberstanden: die geistig und körperlich höherstehenden Aurignac-Menschen haben vermutlich die Neanderthal-Rasse, die auch dem Klima nicht standhalten konnte, ausgerottet. Daß sich zwischen diesen Rassen ein heftiger Kampf abgespielt hat, darf man schon deshalb vermuten, weil in der Halbgrotte von Krapina in Kroatien Knochen von beiden Menschenrassen der Eiszeit gefunden wurden, wovon ein Teil Spuren von Kannibalismus trägt. Geschlechtliche Vermischung der Aurignac-Menschen mit dem Neanderthaler war dennoch nicht ausgeschlossen, und Skelettformen aus späterer Zeit (Typus Chancelade) scheinen die Mischung dieser beiden Rassen zu bezeugen. Während der Mischtypus von Chancelade – ein kleiner Körper mit großem Kopf – Anklänge an die heutigen Eskimos zeigt, handelt es sich bei dem Mischtypus von Cro-Magnon um auffallend große Menschen.

Dem Cro-Magnon-Menschen fehlen alle typischen Merkmale des Neanderthalers; die Gliedmaßen sind von kräftigem, grobknochigem, aber doch feinerem Bau als die des Neanderthalers. Seine Größe beträgt im



Handskelett eines Cro-Magnon-Menschen (links) aus den Grotten von Grimaldi bei Mentone und eines mittelgroßen rezenten Menschen (167 cm) zum Vergleich. Aus den Größenverhältnissen geht die hohe Statur der Cro-Magnon-Rasse hervor. Nach «Les Grottes de Grimaldi». Monaco 1910.



Ein Schädel von negroidem Typus (der sogenannte «Crâne de l'adolescent») aus den Grotten von Grimaldi bei Mentone. Nach «Les Grottes de Grimaldi», Monaco 1910.

Durchschnitt 180–190 cm und kommt somit der der höchstgewachsenen jetzt lebenden Rassen gleich. Der Schädel besitzt den bedeutenden Rauminhalt von 1550 ccm, was mindestens dem Durchschnitt der rezenten Europäerschädel entspricht, und erinnert in seiner Breite an die Neanderthal-Rasse, in seiner schönen Wölbung und seiner Höhe an die Aurignac-Rasse, mit beiden aber teilt er die beträchtliche Länge. «Das Gesichtsskelett nähert sich mehr der Aurignac-Rasse, in dem Vorsprung der Kinngegend aber werden beide Rassen übertroffen durch die Annäherung an den jetzigen Zustand» (Klaatsch-Andree). Der Cro-Magnon-Mensch besitzt keine Augenbrauenwülste, er hat keine großen runden, sondern fast viereckige Augenhöhlen. Seine Kiefer sind orthognath oder nur in geringem Maße prognath.

Zur Cro-Magnon-Gruppe kann auch nach Klaatsch-Andree ein Mischtypus gezählt werden, der bei Mentone gefunden wurde und der negroiden Merkmale trägt («Grimaldi-Rasse») (s. obenstehende Abb.) und ein Mischtypus, den Maška 1894 bei Předmost in Mähren entdeckte.

Aurignac-Rasse und Cro-Magnon-Rasse sind nach Zeit und Raum nicht genau zu unterscheiden, beide Formen gehen durcheinander, was nach Weinert deshalb bedeutungsvoll ist, weil von dieser Epoche ab eine stammesgeschichtliche Verbindung dieser beiden Rassen zu den noch lebenden Rassen festzustellen ist. Den nordischen Menschen mit dem schmalen, hohen Gesicht findet man erst in der jüngeren Steinzeit, im Neolithikum, doch zeigen schon

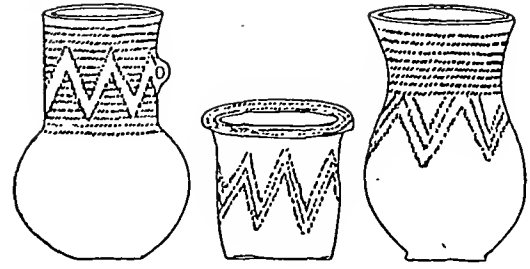
einige Schädel des Mesolithikums (Frühneolithikum) nordischen Typ. Da aus dem Mesolithikum nur wenige Knochenfunde vorliegen, ist vorläufig die Weiterentwicklung der jungsteinzeitlichen Rassen aus älteren Formen nicht zu erkennen und demgemäß ihre Einteilung nicht genau durchzuführen. Auch der Versuch von A. Schliz, Völkergruppen z. B. schnur- und bandkeramische Kulturkreise (so genannt nach Art oder Entstehung der Ornamente auf den keramischen Erzeugnissen; bandkeramischer Kulturkreis: bandförmige Ornamente; schnurkeramischer Kulturkreis: Schnurabdrücke als Ornamente), nordische Megalithkultur usw. zu identifizieren, führte nicht zum Aufbau einer sicheren Chronologie. Immerhin läßt sich über die bunte Völkerzusammensetzung Mittel- und Osteuropas im Neolithikum etwa folgendes sagen: Im nordischen Kulturleben machte sich wahrscheinlich auch ein südöstlicher Volkseinschlag aus der Gegend des heutigen Schlesiens und Böhmen her bemerkbar. In der Gegend des heutigen Sachsens und Thüringens saßen nach O. Reche langschädelige Schnurkeramiker, die vielleicht als Eroberer weithin

Die zwei Skelette mit negroidem Habitus aus der «Kindergrotte» von Grimaldi bei Mentone. Links das Skelett einer alten Frau, rechts das eines jungen männlichen Individuums. Nach «Les Grottes de Grimaldi», Monaco 1910.





Oben: sogenannte Bandkeramik aus Mitteld Deutschland.
Rechts: sogenannte Schnurkeramik. Die Ornamente sind
durch Schnureindrücke entstanden. Nach A. Schütz.



ihre Sprache verbreiteten (Jacob Friesen). Seit dem Spät-Magdalénien drängen nach v. Eikstedt dunkle Kurzkopfgruppen (ostische oder alpine, später dinarische) vom Südosten nach Europa herein, und auch im Norden Europas schweifen in postglazialer Zeit Kurzköpfe, die Lappen. Reste der Cro-Magnon-Rasse (fälsche Rasse) verschmelzen mit der langschädelligen nordischen zu den Germanen.

Mit den Germanen wird aber schon die Schwelle der geschichtlichen Zeit betreten, denn über Germanen wie auch über Kelten liegen die Berichte römischer Schriftsteller vor. Somit ist von germanischen Zeiten an auch schon eine sicherere Gliederung Europas nach Völkern möglich. Es ist die Verteilung der Völker, wie sie die Zeit vor der Völkerwanderung charakterisiert.



Bei Angina pectoris

werden Krampfbereitschaft und Schmerzempfindung
häufig günstig beeinflusst durch

Spasmo-Cibalgin-Suppositorien



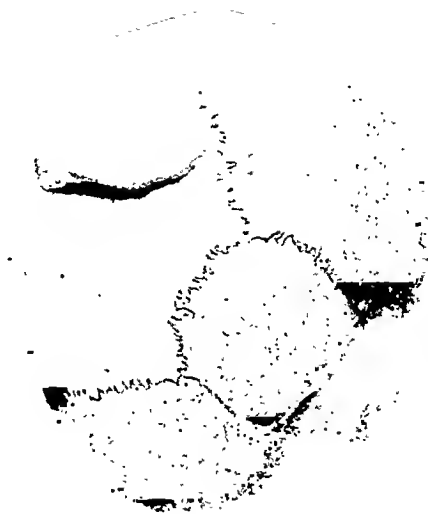
Von den Krankheiten des vorgeschichtlichen Menschen

Von Dr. Reinhard Hofschlaeger

Während für die Untersuchungen des Prähistorikers besonders «Grabbeigaben» und andere Spuren des Kulturlebens wichtig sind, schenken der Paläontologe und der Anthropologe hauptsächlich den Funden menschlicher Knochen ihre Aufmerksamkeit und würdigen auch die kleinsten Stücke einer genauen Prüfung, weil selbst geringfügige Überreste unter Umständen Aufschluß geben über die Entwicklung des Menschen aus plumpen, fast tierischen Formen zu rezenten Menschenformen. Das Messen und Vergleichen der gefundenen Schädel ermöglicht es ferner dem Anthropologen, Schlüsse über die Verbreitung früherer Rassen und Unterrassen zu ziehen.

Darüber hinaus aber kann die Beschaffenheit eines Knochens sehr Bestimmtes über den Gesundheitszustand des betreffenden vorgeschichtlichen Menschen aussagen, je nachdem sie normale oder pathologische Zustände, Regelwidrigkeiten oder Mißwuchs verrät. Läßt sich das geologische Alter eines solchen Fundes bestimmen, so ergeben sich damit auch für das Alter einer bestimmten Krankheit innerhalb der Menschheitsentwicklung Anhaltspunkte. Die Häufigkeit oder Seltenheit einer bestimmten pathologischen Veränderung an fossilen Knochen weist auf stärkere oder geringere Verbreitung einer Krankheit hin.

Ergründen Paläontologie und Geologie die biodynamischen Verhältnisse, die den Urmenschen antrieben, aus seinem Entstehungsgebiet auszuschwärmen, stellen sie zudem die Wanderstraßen fest, auf denen sich die Urmenschheit über die Erde zerstreute, so kann man auch mit ihrer Hilfe die ersten Wanderstraßen ansteckender Krankheiten und Seuchen ermitteln oder wenigstens vermuten, sofern diese Seuchen Veränderungen an menschlichen Knochen hinterlassen haben. Bei dem Versuch, die Wege zu erkennen, auf denen sich Seuchen der Vorzeit ausgebreitet haben, stößt aber die paläontologische Forschung auf große Schwierigkeiten. Denn die paläontologischen Funde sind umso seltener, je weiter sie in die vorgeschichtliche Zeit zurückreichen. Vom Typus des Neanderthalers besitzt man z. B. nur etwa dreißig Schädel, und von diesen Schädeln zeigen die wenigsten pathologische Veränderungen. Zahlreicher werden



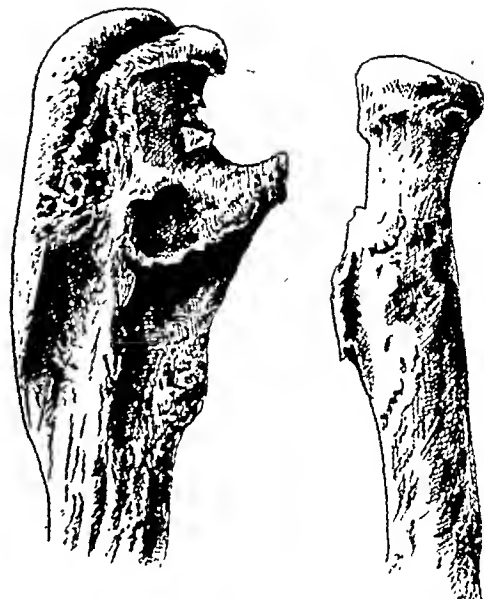
Schädel (wahrscheinlich aus dem frühen Mittelalter) mit Schalkknochen und verheiltem Spaltbruch am rechten Scheitelbein. Ossuarium Gammünster. Nach K. Jäger.

die Zeugnisse vorgeschichtlicher Krankheiten erst von der Kulturperiode ab, in der es allgemein Sitte wurde, die Toten zu begraben. Selbst wenn es sich bei der Bestattung nur um ein Verstecken des Leichnams in einer Höhle handelte, so wurde die «bestattete» Leiche dadurch doch oft der Vernichtung durch jene Tiere entzogen, die in der Natur die «Feldpolizei» ausüben. Unter günstigen Umständen konnte sich das Skelett eines bestatteten Leichnams viele Jahrtausende unversehrt erhalten. Finden sich Grabbeigaben, so besteht unter Umständen die Möglichkeit, eine Beziehung zwischen Krankheiten und gewissen kulturellen Verhältnissen aufzustellen.

Zahlreiche Veränderungen an fossilen und prähistorischen Skeletten sind durch Traumen entstanden, durch Unglücksfälle, bei Kämpfen mit wilden Tieren oder mit Menschen. Am Skelett des bei Düsseldorf gefundenen Neanderthalers z. B. erscheinen das distale Ende des linken Humerus und das proximale Ende der linken Ulna stark deformiert. Nach Schwalbe muß lange vor dem Tode eine Luxation der Speiche stattgefunden haben, die in der Folge nicht eingerichtet wurde und die höchstwahrscheinlich

scheinlich kombiniert war mit einer Infraktion des proximalen Ulna-Endes. An einem bei Ehringsdorf (Weimar) gefundenen neanderthaloiden Unterkiefer eines Mannes ergab die Untersuchung, daß die beiden rechten Schneidezähne außerhalb der Reihe standen und ihre Kronen nach innen kehrten; die beiden Zähne selbst sind nicht mehr erhalten. Diese regelwidrige Zahnstellung ist vielleicht durch einen Schlag herbeigeführt worden. Ferner weist der Schädel eines dort gefundenen jungen weiblichen Individuums am Stirnbein Hiebmarken auf, so daß man vermuten darf, daß das Mädchen erschlagen wurde. Auch an dem bei Krapina gefundenen Skelett konnte Gorjanovič-Kramberger pathologische Veränderungen feststellen. Ein Stirnfragment weist am rechten Augenbrauenwulst Löcher und Furchen auf, die auf eine Verletzung schließen lassen, außerdem konnten ein Bruch der Elle und ein Schlüsselbeinbruch festgestellt werden. Der Schädel eines bei Cro-Magnon gefundenen weiblichen Skelettes zeigt eine tiefe, wahrscheinlich durch einen Beilhieb verursachte Wunde. Broca nimmt an, daß die Verletzung gecitert hat und dann vernarbte, so daß die Verletzte noch

Beckenfragment mit Zertrimmerungsfraktur des Schenkelhalses, die mit knöcherner Ankylose und unter Sequesterabstoßung geheilt ist. Nach K. Jäger.



Teile von prähistorischen Skeletten aus Nubien, die Symptome von «Höblengicht» aufweisen. Nach G. Elliot Smith und M. Armand Ruffer.

einige Wochen weitergelebt hat. An neolithischen Knochen aus der Vendée fiel Marcel Baudouin die Häufigkeit von Vorderarmbrüchen auf, und zwar besonders an weiblichen Knochen. L. Pfeiffer berichtet von einem steinzeitlichen Skelett (Massengrab bei Kalbsrieth, westlich von Halle a. S.) mit geheilter schwerer Schädelverletzung und Wilser von einem frühgermanischen Schädel (Mannheimer Sammlung), an dem ebenfalls eine ungem. schwere Verletzung – Spaltung des linken Scheitelbeines und der Stirn – mit überraschendem Erfolg behandelt worden war: Die Wunde ist geheilt bis auf eine im Stirnbein offengebliebene Lücke. Ein altperuanischer Schädel aus Viru (Prov. Libertad, Peru) (Sammlung des naturhistorischen Museums in Wien) ist dadurch bemerkenswert, daß an ihm eine komplizierte Fraktur des linken Parietale ausgeheilt ist und nur einen spaltartigen Lochdefekt hinterlassen hat. Die Asymmetrie des Schädels läßt darauf schließen, daß die linke hintere Hirnhälfte in der Entwicklung zurückgeblieben ist. «Das Individuum überstand die schwere Verletzung in der Jugend» (Karl Jäger). Auch an dem in der anthropologisch-prähistorischen Sammlung zu München befindlichen Fragment eines Beckens ungewisser Herkunft weist Jäger eine Zertrimmerungsfraktur des Schenkelhalses nach, die



nach starker Eiterung und Sequesterabstoßung mit knöcherner Ankylose ausgeheilt ist (siehe Abbildung Seite 2320).

Jägers Untersuchungen erstreckten sich auch auf Extremitätenknochen des Ossuarius von Chammünster (Bayern), der größten der noch bestehenden Beingrüfte, dessen Inhalt hauptsächlich wohl aus dem frühen Mittelalter stammt. Eine Reihe dieser Knochen weist Frakturen auf, von denen 43% gut, 57% schlecht geheilt sind. Diese Zahlen haben, wie Jäger selbst bemerkt, nur bedingten Wert. Schlecht geheilt sind die Gelenkbrüche und die komplizierten Knochenbrüche. Mehrere Oberschenkelbrüche hinterließen Verkürzungen von 6,8–10,5 cm. Die vielen Fälle von traumatischer Osteomyelitis – von den 19 Oberschenkelbrüchen sind 11 mit Osteomyelitis geheilt – betrachtet Jäger als sekundäre Infektionen; sie sprechen vor allem für eine verminderte Widerstandsfähigkeit gegenüber Infektionen.

Gegenüber Wundinfektionen war der *Homo sapiens diluvialis* – so bezeichnet Weinert den Neanderthaler, den *Homo primigenius* Schwalbes – wohl widerstandsfähiger als der Jungsteinzeitmensch. Man besitzt aber aus der Jungsteinzeit und der frühen Metallzeit viel mehr Skelette als aus der Altsteinzeit, so daß ein zu sicheren Schlüssen berechtigender statistischer Vergleich nicht möglich ist. Von der jüngeren Steinzeit an sind traumatische und genuine Osteomyelitis ziemlich häufig. G. Elliot Smith und E. Wood Jones, die rund 6000 Skelette, getrocknete Kadaver und Mumien aus frühneubischer Zeit untersuchten, fanden selten septische Entzündung bei komplizierten Knochenbrüchen, wohl aber Osteomyelitis. Von 19 Femurfrakturen aus dem Ossuarium Chammünster sind elf Fälle, die Spuren einer Osteomyelitis aufweisen, geheilt; nach Jäger handelt es sich wahrscheinlich um komplizierte Frakturen mit sekundärer Infektion. Roy L. Moodie veröffentlichte aus der vorkolumbischen Zeit Perus einen schweren Fall von Mastoiditis, bei dem es nicht zu letalem Ausgang kam, obwohl der Eiterherd nach außen und innen durchgebrochen war.

Tiere und Menschen, die in feuchten Höhlen wohnen, werden oft von der Arthritis deformans befallen («Höhlengicht», s. Abb. S. 2320). Beim diluvialen Höhlenbären erstreckten sich die pathologischen Veränderungen über alle Skeletteile. Der diluviale Urmensch, der dem

Skelett eines rachitischen Kindes von einem Friedhof aus der Merowingerzeit. Nach Georg Wilke.



Höhlenbären die Wohnhöhle streitig machte, hatte in der gleichen Weise unter Höhlengicht zu leiden. Sie trat mit Vorliebe an den Gelenken der Wirbelsäule, aber auch an anderen Gelenken auf. Bemerkenswert ist in dieser Beziehung ein Krapina-Unterkiefer. Die Arthritis deformans war während der ganzen Steinzeit überaus häufig und ist auch in der Bronzezeit und den frühen Perioden der Eisenzeit vielfach nachgewiesen. In Dänemark nimmt sie unter den Funden der Steinzeit, die pathologische Veränderungen zeigen, einen breiten Raum ein; Gleiches gilt auch für die Frühzeit Ägyptens und des Sudans.

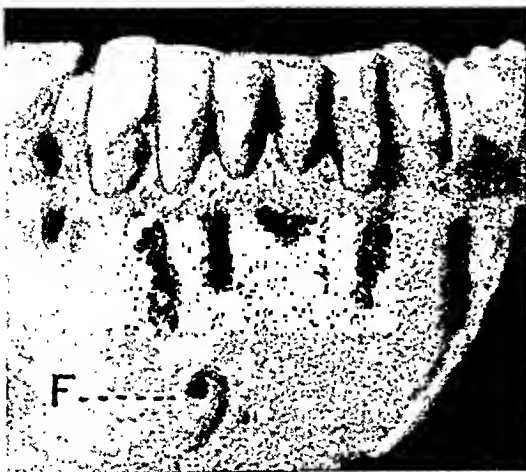
Die Rachitis ist nach Jäger bei Völkern mit Brusternährung unbekannt. Der Meinung Rudolf Virchows, daß der Neanderthaler an Rachitis gelitten habe, schloß sich Schwalbe nicht an. Er wies nach – und Klaatsch bestätigte seine Feststellungen –, daß es sich bei der starken Krümmung der Oberschenkelknochen um Rasseigentümlichkeiten handelt und daß Rachitis vollkommen auszuschließen ist. Der Kopenhagener Hygieniker H. A. Nielsen untersuchte Menschenreste aus 81 jungsteinzeitlichen Gräbern – im ganzen 616 Individuen beiderlei Geschlechts und jeden Alters. Die Befunde ergaben neben Arthritis deformans, Myositis ossificans, Fungus durae matris, Skoliosis, Zahnveränderungen

auch Rachitis. Georg Sticker konnte an Knochenresten aus Alemannengräbern des fünften christlichen Jahrhunderts feststellen, daß Rachitis und Skorbut als Mangelkrankheiten zu den schweren Plagen gehörten, die das Volk der Alemannen in den Zeiten der Völkerwanderung heimsuchten.

Manche urzeitlichen Kiefer sind durch ein schlechtes Gebiß gekennzeichnet. Hans Virchow führt dies auf die Verunreinigung der Nahrung durch Sand zurück, der die Kauflächen der Zähne abschleife. Außerdem macht er dafür auch den Umstand verantwortlich, daß die Zähne als Werkzeug benützt wurden. Durch die starke Abnutzung der Zähne wird der Zahnkanal und die Pulpa freigelegt, wodurch Alveolarabszesse entstehen können (s. untenstehende Abb.). Zahnkaries kam beim eiszeitlichen Menschen nicht vor, allerdings hat der Rhodesia-Mann «mehr als einen hohlen Zahn gehabt» (Weinert), obwohl er mit den starken Knochenauflagerungen über dem Orbitalrand und am Hinterhaupt einen noch urtümlicheren Eindruck erweckt als mancher Neanderthaler. Hingegen ist Zahnkaries in der jüngeren Steinzeit kein ganz seltener Befund (1,5–3%). Und in der Bronzezeit ist die Zahnkaries schon sehr verbreitet, wie Schädel aus Flachgräbern des Tegeler Sees bei Berlin (etwa 16.–14. Jhdt. v. Chr.) beweisen, die nach H. Virchow wegen ihrer für prähistorische Verhältnisse häufigen Zahnkaries einen recht «modernen» Eindruck machen. Diese Befunde stimmen mit der Auffassung von F.W. Proell überein, nach der eine primitive Rasse sehr schnell die Kariesresistenz einbüßen kann.

Paradentose ist nach Proell schon beim di-

Unterkiefer von Krapina. Infolge eines Alveolarabszesses hat sich eine Fistel (F) gebildet. Nach Georg Wilke.



luvialen Urmenschen die weitaus häufigste Ursache des Zahnverlustes wie auch heute noch bei primitiven Völkern. Ebenso ist auch Zahnsteinbildung schon an Zähnen aus der Diluvialzeit zu bemerken.

Wie und wann die drei schweren Infektionskrankheiten Tuberkulose, Syphilis und Lepra zum ersten Mal in der Entwicklungsgeschichte des Menschen auftraten, ist ungewiß, wahrscheinlich, so führt Ludwig Aschoff aus, wurde der Mensch von einem gewissen Zeitpunkt an der Infektion zugänglich und übernahm die Erreger von den wildlebenden Tieren, die sie beherbergt hatten, ohne vielleicht selbst krank zu sein. So kam es im Laufe der Zeit zu Seuchen, die zur Zeit des Neanderthalers anscheinend noch nicht aufgetreten waren.

Die Tuberkulose forderte, den «knöchernen Urkunden» nach zu schließen, in Ägypten in prädynastischer Zeit und nördlich der Alpen in der jüngeren Steinzeit ihre Opfer. Ein von Paul Bartels untersuchtes neolithisches Skelett von Heidelberg mit Veränderungen am 4. und 5. Brustwirbel und Kyphoskoliose läßt den ziemlich sicheren Schluß zu, daß die Tuberkulose im Gebiet des heutigen Deutschland schon in der jüngeren Steinzeit vorkam. Die Tatsache, daß schon in prädynastischer Zeit im Alten Ägypten Knochentuberkulose, also auch wohl Lungentuberkulose, vorgekommen ist, wird durch die Untersuchungen von Elliot Smith und Armand Ruffer erhärtet. Das typische Bild der Pottschen Krankheit an der Mumie eines jungen Priesters (s. Abb. S. 2323) veranlaßte Smith und Ruffer, bei späteren Ausgrabungen mehrere Fälle als Tuberkulose zu bestimmen. Lungentuberkulose und Skrofulose waren bei den indogermanischen Hirtenvölkern früheste Volkskrankheiten.

Was Lepra und Syphilis betrifft, so weist Georg Sticker darauf hin, daß Syphiliskranke wie Leprakranke aus der menschlichen Gesellschaft ausgestoßen wurden und kein geordnetes Begräbnis erhielten. Ihre Skelette waren daher zerstörenden Einflüssen preisgegeben. Somit ist es erklärlich, daß für das Vorkommen von Lepra und Syphilis in der Vorzeit nur mangelhafte Beweise vorliegen. In geschichtlicher Zeit war die Lepra stets bekannt: Die Elephantiasis Graecorum, die die altgriechischen Ärzte aus Vorderasien kannten, entspricht in allen Zügen der Lepra. In Unterägypten war die Elephantiasis Grae-



Ägyptische Mumie aus der Zeit der 21. Dynastie (um 1000 v. Chr.) mit den Merkmalen der Pottschen Krankheit. Nach einer Skizze von Mrs. Cecil Firth.

corum von jeher eine verbreitete Krankheit. Bei den Germanen war sie, wie Galen angibt, selten zu finden, in Mysien und bei den Skythen gar nicht; hingegen kam sie bei den Kelten, besonders bei den Galliern und auch bei dem nach Kleinasien verirrten keltischen Zweig, den Galatern, nach Stickers Ansicht sicher vor.

Ob die Syphilis, von der noch heute manche Naturvölker frei sind oder es bis vor kurzem waren, schon in der Vorzeit auftrat, darüber geben vorgeschichtliche Gräber nur sehr mangelhaft Auskunft. Sticker sagt mit aller Vorsicht, daß aus früher Zeit, aus der ägyptischen Königszeit und aus Gräbern der Steinzeit, nicht mehr als je zwei oder drei Knochen vorliegen, an denen Veränderungen zu sehen sind, die man für syphilitisch zu halten berechtigt ist. Paul Raymond entdeckte in den Begräbnisgrotten im Tal des Petit Morin (Marne) unter Knochenmassen aus spätneolithischer Zeit einen Humerus und eine Ulna mit den Merkmalen gummöser Osteomyelitis

(s. untenstehende Abb.). Die Diagnose wurde später von namhaften Pathologen bestätigt. Unter nubischen Funden vom Jahre 2000 v. Chr. wurden drei oder vier Knochen entdeckt, die den «Verdacht auf Syphilis erregen» (Sudhoff). Von amerikanischen Syphilisfunden ist ein Kinderschädel aus dem Alten Peru zu erwähnen, der bei Machu Picchu ausgegraben wurde und eine Nekrose am Stirnbein zeigt, die nach George Eaton völlig dem Bilde der heutigen syphilitischen Karies entspricht (siehe Abb. S. 2324). Weiter zeigt ein unzweifelhaft präkolumbischer Knochen (Tibia), der 1917 im Tacna-Arica-Gebiet gefunden wurde, bei mikroskopischer wie röntgenologischer Untersuchung die charakteristischen Merkmale einer syphilitischen Osteoperiostitis (Ann. med. History N. S. 8 [1936], 232; Sudhoffs Mitt. 36 [1937], 55). Funde von sogenannter vorkolumbischer Syphilis gibt es sonst in

Osteomyelitis gummosa an Knochenfunden aus Begräbnisgrotten im Tal des Petit Morin (Marne). Nach P. Raymond.



Amerika nur wenig. Die wichtigsten liegen nach Sudhoff im Nordwesten, auf der von dem Geographen Friedrich Ratzel (1844–1904) erkannten uralten Völkerstraße zwischen der Alten und der Neuen Welt, die über die Meerenge der Bering-Straße, über die Aläuteninselnkette oder von Japan aus über die Kuroschivodrift führt; sie könnte der Weg der »phönikischen Krankheit« gewesen sein. Daß nämlich im griechischen und römischen Altertum die Geschlechtskrankheit vorhanden war, die heute als Syphilis bezeichnet wird, ist zum mindesten wahrscheinlich. Sticker erinnert u. a. an die Sokratesbüsten, die das deutliche Bild einer syphilitischen Entstellung vermitteln. Einwandfreie Beweise für das präkolumbische Vorkommen der Syphilis in Europa liegen freilich nicht vor. Bei den einzigen Skelettstücken, die sicher syphilitische Veränderungen zeigen, macht Aschoff geltend, daß deren Herkunft aus einem neolithischen Grabe – heute, sechzig Jahre nach ihrer Entdeckung – sehr zweifelhaft sei; alle Versuche, an Hand von Knochen das präkolumbische Alter der Syphilis in Europa festzustellen, seien fehlgeschlagen. Aschoff glaubt deshalb, die Ansicht vom amerikanischen Ursprung der Syphilis unterstützen zu können. Im übrigen soll die umfangreiche Literatur über den Ursprung der Syphilis hier nicht berührt werden.

Zwei Krankheiten hat der Mensch nicht erst in der sogenannten Domestikationsperiode erworben, sondern brachte sie schon von seinen tierischen Vorfahren her mit: die Mißbildungen und den Krebs. Es unterliegt, wie Aschoff bemerkt, keinem Zweifel, daß die Menschheit, solange sich ihre Geschichte zurückverfolgen läßt, an ganz bestimmten Mißbildungen gelitten hat, und es gibt keine höhere Tierart, die nicht auch Krebs aufzuweisen hätte.

Für das Auftreten von Krankheiten werden häufig auch Rassenmischungen verantwortlich gemacht. Allerdings sollen nach der Auffassung einiger Forscher (Reibmayr, Kretschmer) Kreuzungen, besonders der alten reinen Rassen, zu höchsten Kulturleistungen führen; andererseits sollen sie aber nach Hildebrandt auch die Ursache von krankhaften Erscheinungen (Rachitis, Turmschädel, Baufehler der Füße, Kretinismus, Geschwülste, Fettsucht, Leistenbrüche, Myopie, Hüftgelenkluxation) sein. Bei einer Rassenkreuzung werde die Kombination der Erbanlagen gestört, und



Kinderschädel aus der altperuanischen Begräbnisstätte Machu Picchu mit syphilitischer Nekrose auf dem Stirnbein und anormaler Stirnmaht. Nach George F. Eaton.

durch das Nichtzusammenpassen der Erbgutteile entstehe ein »Gen-Chaos«. Als Beispiel, daß Rassenmischung infolge disharmonischer Kombination körperlicher Anlagen nachteilig wirkt, werden die bei Mischrassen besonders häufig auftretenden Geburtsschwierigkeiten angeführt, die durch ein zu enges Becken bedingt sind. So weiß man, daß sich die Geburtsschwierigkeiten bei Naturvölkern erst seit ihrer Vermischung mit anderen Rassen gehäuft haben. Ob die in germanischen Ländern auftretenden Geburtsschwierigkeiten durch Nichtzusammenpassen der Erbeinheiten entstehen, ist nach Agnes Bluhm schwer zu entscheiden, da die Beckenform besonders stark durch Rachitis verändert sein kann.

Aus der Beschaffenheit fossiler Knochen lassen sich also, kurz zusammengefaßt, drei verschiedene Arten von pathologischen Erscheinungen erkennen: 1. Krankheiten, die ein Erbe aus der Tierzeit sind, 2. Krankheiten, die mit der Kultur gewissermaßen als »Domestikationserscheinungen« auftreten, durch die Kulturentwicklung sich häufen und bedrohliche Ausmaße annehmen können, und 3. pathologische Erscheinungen, die als Folgewirkung von Rassenmischung zu betrachten sind. Krankheiten, die am Knochengerüst keine Veränderungen hinterlassen, wie Hautleiden, Augenleiden, Masern, Scharlach, Pocken, sind selbstverständlich durch die Wissenschaft des Spatens nicht zu erfassen.

Spastisch bedingte Schmerzzustände:

Spasmo-Cibalgin

«Nach unseren Untersuchungen beseitigt Spasmo-Cibalgin Spasmen und Schmerzen im Magendarm- und Urogenitaltractus, zu deren Behandlung nach den allgemeinen Erfahrungen sonst Narkotica erforderlich gewesen wären. Auch bei einer Reihe von Angina-Pectoris-Kranken sahen wir von diesem Präparat eine deutlich krampflösende und schmerzstillende Wirkung.»

Über die Behandlung spastischer Zustände. Von Dr. Rütger. Aus der Medizinischen Klinik der Medizinischen Akademie Düsseldorf (Direktor: Prof. Dr. E. Edens). Klin. Wschr. Nr. 32, 1937.

Von der Heilkunst des vorgeschichtlichen Menschen

Von Dr. Reinhard Hofschlaeger

Zum besseren Verständnis der Aufschlüsse, die die vorgeschichtlichen Funde über die Heilbestrebungen des Urmenschen geben, sei eine kurze Darstellung des Uraufbaues der Heilkunst vorausgeschickt, wie ihn Verf. auf anderen Wegen ermittelt hat. Diese Darstellung der Heilkunst des Vorzeitmenschen zeigt auf, daß von allen Zweigen der Vorgeschichtsforschung die Urmedizin das Gebiet ist, von dem aus sich erfolgreiche Vorstöße in die Zeit der Menschwerdung unternehmen lassen, also in unendlich fernegelegene Abschnitte der menschlichen Kulturentwicklung, die nach weit verbreiteter Anschauung kulturgeschichtlich für unerforschbar gelten.

Die Heilbestrebungen des Vorzeitmenschen waren ursprünglich dieselben wie die des Tieres. Gegen lästige Körperreize und schmerzhaft empfindungen wehrte sich der colithische Anthropoide der Steppe durch niedere Reaktionen, d. h. durch Formen der Selbsthilfe, wie sie Tieren zu Gebote stehen. In der Zeit der Menschwerdung verstärkt sich in der Steppe der Trieb zur gegenseitigen Hilfe, und das Gepräge der Heilkunst ändert sich: *alle Formen der Selbsthilfe werden auch Formen des gegenseitigen Beistandes* und zwar eines

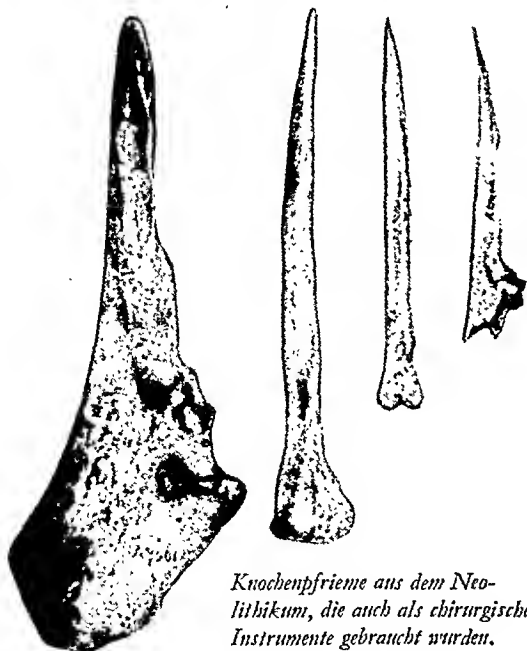


Steinwerkzeug (sog. Lorbeerblattspitze) aus dem Solutrén. In Deutschland gefunden.

bewußten gegenseitigen Beistandes, was erst durch das Vorhandensein von Sprache und Bewußtsein ermöglicht wird. Die gegenseitige Hilfe bewegt sich in den Bahnen, die durch die niederen Reaktionen vorgezeichnet sind; sie wird aber doch von der Vorstellung bestimmt, daß ein Fremdkörper die Krankheit verursache, eine Idee, die für die Heilkunst des archäolithischen Frühmenschen wegweisend wird. Ein solches bewußtes Heilbestreben erreicht mit den elementaren Heilformen auch ohne Anwendung von Geräten und Werkzeugen stärkere Wirkungen, als sie in der «Tierzeit» des Menschen erreicht werden konnten.

Außerdem wandelt sich die Heilkunst auch insofern, als dieselben Tätigkeiten, die früher nichts anderes als niedere Reaktionen bedeuteten – Belecken, Saugen, Kneten, Drücken, Schütteln, Pusten, Abreiben usw. – nun *bewußt* als Heilmethoden bei *inneren* Krankheiten ausgeübt werden. Die Entwicklung des Hilfstriebes schlägt aber, und zwar ebenfalls von der Tierzeit an, noch einen anderen Weg ein, der gekennzeichnet wird durch das Prinzip: *contraria contrariis*. Der Vorzeitmensch folgt dabei dem Trieb, bei bestimmten Zuständen oder schmerzhaften Empfindungen den entgegengesetzten Zustand oder die entgegengesetzte Empfindung herbeizuführen. Dieses Bestreben ist allerdings für die Entwicklung der Urmedizin nicht so bedeutungsvoll wie die Vorstellung von einem die Krankheit verursachenden Fremdkörper, die den vorgeschichtlichen Menschen mannigfache Heilverfahren ausprobieren und finden läßt.

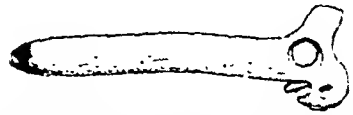
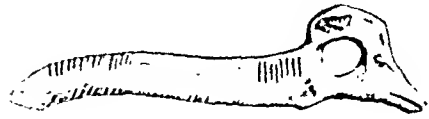
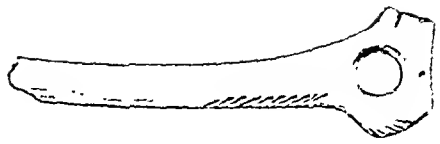
Durch den allgemeinen Gebrauch von Werkzeugen und Waffen sind beim Vorzeit-



Knochenpfrieme aus dem Neolithikum, die auch als chirurgische Instrumente gebraucht wurden.

menschen der gekennzeichneten Epochen Verletzungen an der Tagesordnung. Mit der Form der Waffen (Aufkommen von Hieb- und Stichwaffen) ändert sich die Art der Verletzung; es wird jetzt der Heilkunst die Aufgabe gestellt, tiefe Wunden zu behandeln. Das Verständnis für den anatomischen Bau des menschlichen Körpers wird an schweren Verletzungen mit breiter Bloßlegung innerer Organe gewonnen oder durch Analogieschluß beim Zerlegen der Jagdtiere, außerdem aber auch durch den Kannibalismus, der, nach Funden in Krapina zu urteilen, vermutlich schon im Altpaläolithikum vorkam. Durch das Zerlegen von Tieren und Menschen bildeten sich auch gewisse physiologische Vorstellungen beim Urmenschen. Durch das Essen von menschlichen und tierischen Organen entwickelte sich die früheste Organtherapie, die nach dem Prinzip «similia similibus» verfährt. Mit zunehmendem und erfolgreichem Gebrauch der Werkzeuge wächst das Vertrauen zum Werkzeug, das man bald auch in der Heilkunst verwendet, ob es sich nun um Selbsthilfe oder um gegenseitigen Beistand handelt. Ein zielbewußtes Vorgehen bei Krankheiten, z. B. die Absicht, den Krankheit verursachenden Fremdkörper durch Saugen zu entfernen, läßt aus dem Saugen ein Verfahren zur Blutentziehung oder zur Entfernung eines Fremdstoffes (Gift) aus dem Körper entstehen, das in späteren Zeiten auch instrumentell ausgeführt wird. Es bilden sich Krankheitsvorstellungen, die als Urform humoralpathologischer Anschauungen zu betrachten sind. Die Skarifikation, das einfache Aufritzen der Haut zum Blutentziehen, die über die ganze Erde verbreitet ist, wird auch im frühesten Alteuropa eines der Hauptmittel der Heilkunst gewesen sein, umso mehr als die Völker der Vorzeit alles andere als blutscheu waren. Und in der Jungsteinzeit gab es sogar bei vielen Stämmen kühne Operateure.

Einen starken Helfer gegen Krankheit und eiszeitliches Klima gewinnt der Mensch im Feuer. Es hilft ihm, der Kälte zu trotzen, gefährliche Raubtiere von sich fern zu halten, und gestattet ihm, bei Krankheit in seine wärmende Nähe zu flüchten. Durch den Besitz des Feuers lernt der Urmensch außerdem eine neue Form von Verletzungen kennen: die Verbrennung. Aber auch die zerstörende Eigenschaft des Feuers weiß der Urmensch der Heilkunst dienstbar zu machen, und wie das Schröpfen absichtlich vorgenommen



Sogenannte Kommandostäbe aus dem Paläolithikum (Magdalenien). Der untere, der mit einem Dorn versehen ist, wurde als Speerwerfer verwendet.

wird, so geschieht es auch mit der Verbrennung. Ein besonders wirksames Mittel ist sie gegen Ektoparasiten, die sich in der Haut festgesetzt haben.

Die Chirurgie, die eine auf der Geschicklichkeit der Hände beruhende Kunst ist, kann nur bestehen, wenn sich häufig Gelegenheit zu chirurgischen Eingriffen bietet. In der Vorzeit ist die Voraussetzung hierfür der zunehmende Gebrauch von Waffen. Die Waffen selbst werden im Verlauf des Paläolithikums komplizierter. Der Speer erhält Steinspitzen, zuweilen auch Widerhaken, die Keule wird zum Wurf verwendet (Bumerang). Zum Schleudern des Speeres dient in der totemistischen Kultur des Aurignacien ein Brett oder auch ein Stab, der einen schrägen Dorn an einem Ende trägt (s. obenstehende Abb.).

Menschliche Tibia mit eingedrungener Silexspitze und dadurch hervorgerufener starker Kallusbildung. Aus einem Dolmen in Font-Réjal (Aveyron). Nach E. Cartailhac.





*Linker
Femurschaft
mit eingeheilter
Pfeilspitze.
Röntgen-
aufnahme.
Nach K. Jäger*

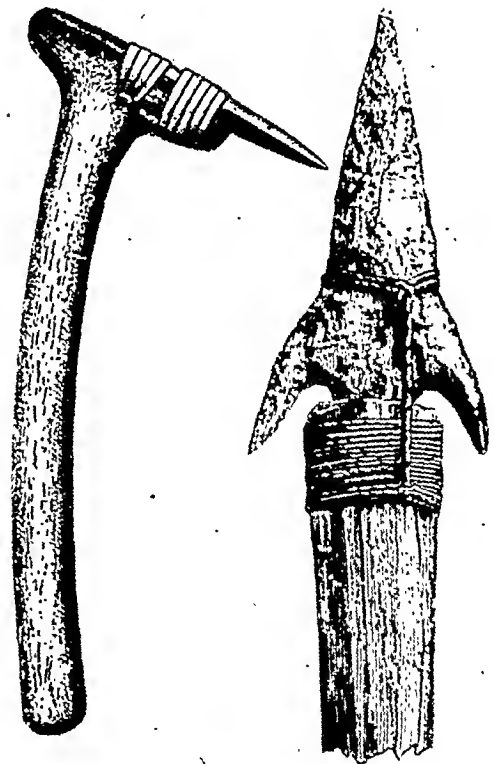
Auf diese Weise wird der Hebelarm verlängert, was die Wucht des Wurfes verstärkt (Foy). Gegen Ende des Jungpaläolithikums erscheinen Pfeil und Bogen, und eine jüngere Steppenkultur bringt nach Ansicht des Verf. die Steinschleuder, die Krickeberg für Amerika einer subarktischen Kultur zuschreibt. Handelte es sich bis dahin bei der Vorstellung von einem die Krankheit verursachenden Fremdkörper nur um eine Fiktion, so sieht sich der Mensch mit der Entwicklung der Angriffswaffen vor das Problem gestellt, tatsächliche Fremdkörper mit oder ohne Verwendung von Werkzeugen aus dem Körper zu entfernen. Gewöhnliche Wurfspieße und Pfeile werden einfach herausgezogen, hat aber die Pfeilspitze einen Widerhaken, so muß unter Umständen der Pfeil mit dem ganzen Schaft durch die Weichteile hindurchgestoßen werden, damit er entfernt werden kann. Da die Waffen oft scharfe Spitzen tragen, die so befestigt sind, daß sie leicht abbrechen, ist häufig ein operativer Eingriff nötig. Bei den heutigen Naturvölkern gibt es Chirurgen, die auf operativem Wege einen Fremdkörper mit großem Geschick zu finden und zu entfernen verstehen, und vielfach sind es Kannibalenstäm-

me, die ein Geschoß mit einer erstaunlichen Gewandtheit und Kühnheit selbst aus Gelenken und aus dem Unterleib herausschneiden können. Da im vorgeschichtlichen Europa Kannibalismus nachgewiesen ist, darf man vermuten, daß auch schon damals mit dem Kannibalismus eine relativ hochstehende Operationskunst einherging. Bei einem Geschoß, das sehr tief in einen Knochen eingedrungen ist oder eine Stelle getroffen hat, an der Blutungen zu befürchten sind, ist die operative Entfernung schwierig. In solchen Fällen weicht der vorgeschichtliche Chirurg Alt-europas wie Uramerikas hie und da ab von der Grundregel, einen Fremdkörper zu entfernen: er läßt das Geschoß an seinem Ort (s. Abb. S. 2327 und S. 2328).

Knochenbrüche heilen beim Vorzeitmenschen wie beim Tier ohne besondere Behandlung durch Schonung des betreffenden Gliedes, und sie heilen schnell.

Durch den Besitz des Feuers, dessen Schein Raubtiere fern hält, ist der Urmensch besser

*Befestigung von Axtklinge und Speerspitze durch Ummwicklung (Amerika). Nach E. Cartailhac. Die Kenntnis dieser Technik führte den Menschen der Vorzeit zum Schien-
nen von Knochenbrüchen.*





*Oberarmgelenk aus einer «Schachthöhle» der Hallstatt-Kultur. Die Vereiterung des Knochens zwang zur Amputation.
Photo: Prof. J. Größ.*

gesichert als sein Tierahne, und mit der Entwicklung des sozialen Empfindens schützen und versorgen die Hordenmitglieder ihre Kranken, soweit die Umstände es zulassen. In Analogie zur Wundbehandlung, wie sie auch Menschenaffen üben, wird Erde oder Lehm auf das gebrochene Glied gepackt; diese Behandlung ist älter als das Schienen. Zu dem Bedürfnis, durch eine Erd- oder Lehmpackung das geschädigte Glied zu kühlen und ruhig zu stellen, tritt das schöpferische Bestreben, eine Art Hülle zu formen. Die Methode, einen Knochenbruch durch Schienen und Binden festzulegen, übernimmt die vorgeschichtliche Chirurgie von der Waffentechnik: Erst, als der Urmensch sich auf die Kunst versteht, zwei getrennte Dinge, etwa einen Speerschaft und eine Speerspitze, durch sorgfältige Umwicklung fest aneinander zu fügen (s. Abb. S. 2328), kann er daran denken, diese von ihm meisterhaft beherrschte Technik auch bei Knochenbrüchen zu versuchen. Zur Regel wird das Schienen von Knochenbrüchen wohl erst in den gesicherten Lebensverhältnissen jener Völker, die man als höhere Viehzüchter und als Pflanzler bezeichnet. Funde von vorgeschichtlichen Verbänden sind eine Seltenheit.

Die ersten Amputationen waren, wie die Verhältnisse bei heute lebenden Naturvölkern annehmen lassen, Noteingriffe bei völliger Zertrümmerung eines Gliedes oder bei Schlangenbissen. Beim Biß besonders gif-

tiger Schlangen ist sofortiges Abhacken des betreffenden Gliedes für manche primitive Völker das einzige Rettungsmittel. Welche Fortschritte in der Metallzeit auf chirurgischem Gebiete erreicht wurden, geht aus einem Fund hervor, den man in einer «Schachthöhle» der Hallstatt-Periode bei Rückersdorf in der Nähe von Nürnberg machte. J. Größ berichtet von einem Oberarmknochen, der deutliche Spuren eines operativen Eingriffes zeigt, und zwar war der völlig zerfressene Knochen amputiert worden (siehe nebenstehende Abb.). Reste eines Wundverbandes aus Leinfasern und Weizenmehl (siehe untenstehende Abb.), die an den beiden Knochenenden sich fanden, lassen Größ vermuten, daß primär eine Wunde vorlag, die infolge unzureichender Behandlung bis auf den Knochen veriterte, was schließlich zu diesem Eingriff zwang.

Amputationen von Fingern sind aus dem Aurignacien durch Handabdrücke an Höhlenwänden bezeugt (s. Abb. S. 2330). Diesen Handnegativen, die nach O. Menghin zu den ältesten Bildern der frankokantabrischen Wandkunst zu rechnen sind, fehlt häufig ein Fingerglied. Die Gründe für die Vornahme solcher Fingeramputationen sind nicht zu erkennen. Möglicherweise ging man, wie es bei

Mikroskopische Aufnahme der Reste eines Wundverbandes, der aus Leinfasern und Weizenmehl bestand. Etwa 900–800 v. Chr. (Hallstatt-Periode). Auf dem Bilde sind die Stärkekörner des Mehles erkennbar. Photo: Prof. J. Größ.





Handabdrücke auf rotem oder schwarzem Grund, die für die Amputation einzelner Fingerglieder beweisend sind, in der Höhle von Gargas (Hautes-Pyrénées). Aurignacien. Nach «The Cave of Altamira» von H. Breuil und H. Obermaier. Madrid 1935.

manchen afrikanischen Stämmen der Fall ist, von der Idee aus, beim Verlust eines Angehörigen oder bei Krankheit ein Opfer zu bringen.

Andererseits aber ist das Abschneiden und das Abhacken von Gliedern eine verbreitete Art der Bestrafung bei alten Kulturvölkern. Das Mittel zur Blutstillung war das Eintauchen des Stumpfes in heißen Sand, heißen Teer oder siedende Flüssigkeiten.

Vermutlich ist die plastische Chirurgie im Zusammenhang mit solchen verstümmelnden Strafmaßnahmen entstanden. Soweit bekannt, waren die altindischen Ärzte die ersten, die eine Nasen- und Ohrenplastik kannten. Es ist anzunehmen, daß der von den Alten Indern ausgeführte Starstich ebenfalls auf entsprechende Körperstrafen zurückgeht. Weiterhin läßt sich auch die Kastration als Strafmaßnahme erklären, andererseits erfolgte die Kastration auch als Kriegsbrauch. Erfahrung in der Kastration erwarben zuerst die Hirtenvölker der Indo-Germanen, Hamito-Semiten und Turk-Tataren. Die ältesten Verfahren bestanden im Abschnüren oder im Zerquetschen der Testes.

So wie die völlige Zertrümmerung eines Gliedes oder die Gefährdung des Lebens durch einen Schlangenbiß den mannhafter Entschluß zur Opferung eines Gliedes verlangten, so konnten auch Funktionsstörungen eines Organs zu einem Noteingriff zwingen. Z. B. verlangte der Verschuß der Harnröhre durch einen Stein oder einen Fremdkörper (kleines Tier) die Urethrotomie. Bei den Nordgermanen gab es dafür besondere Spezialisten, wie sie in geschichtlicher Zeit auch im Alten Griechenland vorkamen.

Mit dem Auftreten der Steinschleuder im technisch besser entwickelten Neolithikum sieht sich die Heilkunst der Vorzeit vor neue Probleme gestellt. Der Schleuderstein zertrümmert zwar auch wie die Steinkeule die Schädeldecke, aber er wirkt noch auf andere Art. Streifschüsse verursachen nämlich oft Gehirnblutungen an der entgegengesetzten, unverletzten Stelle. Um den Sitz der Blutung zu finden, muß der Chirurg den Schädel an einer unversehrten Stelle öffnen. Er tut es zuerst vorsichtig durch Schaben, später, kühner geworden, durch Herausschneiden von quadratischen oder rechteckigen Knochenstücken oder durch Herausbohren von kreisrunden Scheiben mit Hilfe des Trepans. Der jungsteinzeitliche Chirurg auf der Höhe seines Könnens behandelt den menschlichen Schädelknochen wie einen zu durchbohrenden Stein oder Tierknochen. Das Ziel der Operation ist die Beseitigung des Knochensplitters, des Blutergusses oder auch des Fremdkörpers, des Dämons. Die animistische Vorstellung, daß ein Dämon im Gehirn sitze, ist die Ursache, daß dieser Eingriff sehr häufig angezeigt erschien, vornehmlich bei Erkrankungen, deren Sitz man im Kopf annahm (Kopfschmerzen, Irrsinn, epileptiforme Erkrankungen).

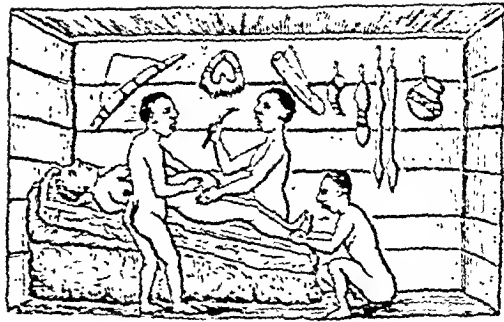
Die zuerst von Wilser und neuerdings mit besonderem Nachdruck von Fritz Paudler ausgesprochene Ansicht, daß der Brauch der Trepanation von West- und Mitteleuropa ausgegangen sei, verdient sorgfältigste Nachprüfung. Verf. selbst hatte 1911 Schleuder und Trepanation dem malayo-polynesischen Kulturstrom zugewiesen, ohne damals zu wissen, daß die Malayo-Polynesier eine südeuropide Komponente haben (v. Eikstedt). (Näheres über Trepanation siehe Ciba Zeitschrift Nr. 39.)

Der Kaiserschnitt wurde ebenfalls schon in der Vorzeit ausgeführt, und zwar nahm

man ihn in der Frühzeit des Ackerbaues, im Paläolithikum, zunächst nur an der während der Schwangerschaft Gestorbenen vor. Animistische Beweggründe mögen zu diesem Brauch geführt haben; denn nach animistischer Auffassung droht den Lebenden Unheil, wenn das Kind nicht aus der toten Mutter herausgeschnitten wird. Man darf annehmen, daß in der jüngeren Steinzeit, als die Ackerbauer dichter siedelten (Vermischung der Rassen?), der Kaiserschnitt auch an der Lebenden vorgenommen wurde. Nach Untersuchungen von Elsewise Haberling beweisen die Sagen nordischer Völker, daß er im Gebiete des heutigen Deutschland altes Volksgut war.

Die Beschneidung wurde im Nillande an nubischen und ägyptischen Hockerleichen der vorgeschichtlichen Zeit festgestellt, und aus etwas jüngerer Zeit sind zwei entsprechende in Stein gehauene Darstellungen erhalten (Sudhoff). In Alteuropa scheint nach Wilke eine rituelle Beschneidung weder bei Knaben noch bei Mädchen üblich gewesen zu sein.

Die Infibulation der römischen Jünglinge aber, die darin bestand, daß durch die Harnröhre ein Stäbchen gesteckt wurde, womit man die Ausübung des Beischlafes und den Mißbrauch der Geschlechtsteile zu verhüten suchte, erweckt ganz den Eindruck eines primitiven Eingriffes. Wahrscheinlich wurde eine derartige Operation vom vorgeschichtlichen Menschen bei der Initiation vorgenommen. Die Kynodesme (Eichelschutz oder Verschuß der Harnröhre durch Zusammen-



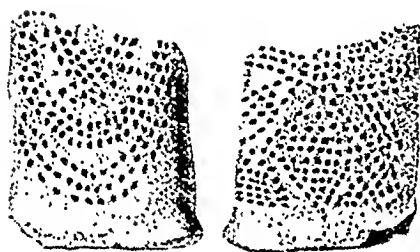
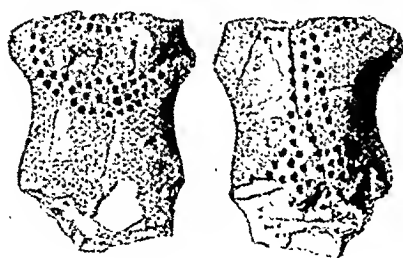
Neger aus Uganda führen den Kaiserschnitt aus, der vermutlich schon im Neolithikum vorgenommen wurde. Nach Felslin.

schnüren des Praeputiums), die bei den Griechen und den Etruskern üblich war, ist noch heute eine ebenfalls mit der Mannbarkeit zusammenhängende Bekleidungs- und totemistischer Kulturen. Es ist anzunehmen, daß die Kynodesme auch in der europäischen Vorzeit als Kulthandlung geübt wurde.

Zahnverstümmelungen sind nach O. Menghin aus dem Paläolithikum nicht belegt, dagegen lassen nach G. Wilke neolithische Schädel der Dogs-Holes, der Perthi Chwaren caves und anderer Höhlen Englands und Spaniens die Vermutung aufkommen, daß aus rituellen Gründen ein Ausschlagen der Zähne vorgenommen wurde. In Japan sind künstliche Zahnverstümmelungen bei vielen Schädeln beobachtet worden, am häufigsten traten sie in der zweiten Hälfte des mittleren Neolithikums auf. Nach Menghin brach man meist die Eckzähne des Oberkiefers oder beider Kiefer oder alle Schneidezähne des Unterkiefers aus, ebenso war Zahnfeilung üblich



Überfall der Samoaner auf die Expedition von La Pérouse auf Tutuila (Samoa-Inseln) im Jahre 1787. Im Vordergrund Eingeborene mit Steinschleudern. Nach einem alten Stich.



Tonfiguren aus der jüngeren Steinzeit von Butmir bei Serajewo (Bosnien) mit Punkttatauierung. Nach M. Hoernes.

Auch im vorgeschichtlichen Europa scheint man Zähne mit einem Stein als Hammer und einem Holzstückchen als Meißel herausgeschlagen zu haben. In diesem Sinne wird wenigstens von Wilke das Fehlen von zwei Backenzähnen an einem zweimal trepanierten Schädel gedeutet. Eine gewaltsame Entfernung von Zähnen konnte an einem Skelett festgestellt werden, das in einem von R. Forrer geöffneten schnurkeramischen Grabe von Achenheim i. E. lag. Zahnfeilung ließ sich nach Wilke an Schädeln aus spätneolithischen Megalithgräbern in der baskischen Provinz Guipúzcoa (Massiv des Aralar, Sierra Aizkorri) nachweisen.

Ein Durchbohren des Ohrläppchens oder des Ohrmuschelrandes muß im frühen Neolithikum Sitte gewesen sein, da nach Menghin Ohrschmuck, z. B. Ohrpflocke in Gestalt von Doppelscheiben, in den spätarktischen oder

den «baltisch-kammgermanischen» Kulturen verbreitet war. Punkttatauierung, mit der oft ein Heilzweck verbunden ist, fällt an Tonfiguren der jüngeren Steinzeit auf (Butmir in Bosnien, Cucuteni in Rumänien, Pfahlbauten im Laibacher Moor, Hissarlik-Troja, Cypern).

Die Frage, ob in der Vorzeit auch die Narbentatauierung geübt wurde, muß von der Ethnologie beantwortet werden. Nach ethnologisch-kulturgeschichtlicher Beweisführung ist die bei Primitiven so verbreitete Narbentatauierung die ursprünglichere Form der Tatauierung. Da die Sitte der Punkttatauierung im Neolithikum erwiesen ist, so ist die Annahme berechtigt, daß im Paläolithikum die Narbentatauierung üblich war. Menghin sieht in gürtelartigen Strichen an einer der weiblichen Statuetten aus der Grotte von Brassempouy (Dep. Landes, Frankreich) einen Hinweis auf Narbentatauierung. Als eine Form von Narbenskarifikation können auch die sogenannten Bregma-Narben, das T-sincipital (siehe Ciba Zeitschrift Nr. 39, «Die Trepanation», S. 1328) an neolithischen Schädeln in Frankreich und an Schädeln der vorgeschichtlichen Bewohner von Teneriffa aufgefäßt werden.

In der sogenannten Nahttatauierung, die besonders von den Eskimo bekannt ist, darf man vielleicht den Ursprung des Haarseiles sehen. Seine Entstehung ist aber vielleicht auch rein medizinischen Ursachen zuzuschreiben, sie kann mit der bei manchen Primitivstämmen (z. B. Karaja-Indianer) bestehenden Sitte zusammenhängen, frische Wunden durch eingeführte Fäden offen zu halten.

Von den erwähnten Eingriffen sind einige als kultische Handlungen bei der Initiation zu betrachten, die, wenn auch nicht allgemein, so doch hie und da in der europäischen Vorzeit üblich waren. Schon dem Paläolithikum gehören an: Narbentatauierung, Zahnausschlagen, Aderlaß, ein Eingriff am männlichen Glied und vielleicht auch schon Ohrdurchbohrung, dem Neolithikum: Punkttatauierung und Zahnfeilung.

Nicht als Kultbrauch zu betrachten ist die Deformierung des Schädels. Sie ist eine unbeabsichtigte Folge der Sitte, das Neugeborene auf ein trogartiges Holzstück festzubinden; und bildet so vielfach ein Stammesmerkmal. Unter dem dauernden Druck verändern die Knochen des kindlichen Schädels ihre Form. Die kulturgeschichtlich-ethnologische Forschung ergab, daß solche Kindertragen zuerst

*Deformierter
Schädel aus dem
frühalemannischen
Gräberfeld
von Obermöllern.
Nach Holter.*



in der totemistischen Kultur erschienen (Walter Pflug). In Alteuropa deuten erst jungsteinzeitliche Schädel (Vendée, Seinebecken) auf diese Art Kinder zu tragen hin. In Deutschland liegen Schädel mit künstlichen Verbildungen aus frühalemannischer Zeit und aus der Merowingerzeit vor (s. obenstehende Abb.).

Bei zahlreichen Skelettfunden aus dem Jungpaläolithikum (Grimaldi, Ofnethöhle [Schwäbisch-Fränkischer Jura], Schussenried [nördlich des Bodensees]) konnte Rötelfarben gefunden werden, mit dem der Körper des Bestatteten bemalt gewesen war. Die Körperbemalung faßt man meist als Schmucksitte auf, ihr Ursprung ist aber ein medizinischer. Die Farbschicht schützt die Haut gegen

Kälte und Sonne, sie hält auch Fliegen ab und wirkt oft heilend bei Hautleiden. Oft hat sie bei Hautleiden auch den Zweck, die Entstellung zu verdecken. Der Primitive leidet besonders stark darunter, wenn eine Krankheit das Äußere nachteilig verändert, und will unter allen Umständen vermeiden, eine Zielscheibe des Spottes zu sein. Ist seine Haut durch Effloreszenzen irgendwelcher Art verändert, so beschmiert er sich gern mit rotem Ocker. Aus demselben Motiv der Scham suchten im Altertum Griechen, Römer und Inder Flechten, Geschwüre, häßliche Narben (Lichen, Lepra usw.) und besonders die verhassten weißen Flecke (Leukoderma syphiliticum), die Schandflecke, durch Farberden und farbige



*Kreisförmige
Schädelstätte
aus dem Jung-
paläolithikum
in den Ofnethöhlen
(Schwäbisch-
Fränkischer Jura).
Die hier
gefundenen Schädel
waren in einer
Masse von rotem
Ocker eingebettet.
Nach
R. R. Schmidt.*



*Darstellung eines
steinzeitlichen
Maskentänzers,
vielleicht eines
Zauberarztes,
der mit einem
Hirschfell
maskiert ist.
Wandmalerei
aus der Höhle
von Trois Frères
(Pyrenäen).
Nach H. Breuil.*

Salben zu vertuschen. So ist es auch erklärlich, daß, wie Stricker ausführt, die Heilwirkung des Quecksilbers im Altertum nicht von Ärzten, sondern von Laien entdeckt wurde, da jedenfalls vor allem das Bedürfnis nach einem kosmetischen Mittel bei der «Entdeckung der nützlichen Quecksilberschmierkur (Unguentum sarazenicum)» maßgebend war.

Der hier gegebene kurze Umriss der vorgeschichtlichen Heilkunst hält sich, abgesehen von der eolithischen und archäolithischen Heilkunst, die Rekonstruktion ist, an Tatsachen, wie sie durch die Untersuchungen der Anthropologen und der Prähistoriker an zahlreichen Höhlen- und Gräberfunden belegt sind.

Von vorgeschichtlichen Tatsachen sei noch ein Bild erwähnt, das wohl als Darstellung eines Zauberarztes gedeutet werden darf (siehe obenstehende Abbildung). Es handelt sich um einen Maskentänzer aus der Höhle von Trois Frères (Pyrenäen). Er ist mit einem Hirschfell bedeckt und soll wahrscheinlich eines jener dämonischen Mischwesen von Mensch und Tier vorstellen, wie sie für die Anschauungen totemistisch-mutterrechtlicher Pflanzerkulturen charakteristisch sind. Das Bild spricht für ein hochentwickeltes Zauber- und

Maskenwesen, mit dem bei heutigen Naturvölkern gewöhnlich auch eine ausgebildete Suggestivtherapie verbunden ist. Der Zauberarzt bedient sich jener mechanischen Maßnahmen, die den Grundstock der primitiven Heilkunst bilden; kennzeichnend und wesentlich bei diesen Maßnahmen ist jedoch, daß sie magischen Anschauungen entspringen, nach denen der Fremdkörper, der die Krankheit verursacht, dämonischen Ursprungs ist.

Die ältesten Heilformen des Menschen sind biologisch bedingte Heilbestrebungen, nämlich niedere Reaktionen, mit denen sich die Tiere helfen. *Die früheste Entwicklung der Heilkunst* im Eolithikum und im Archäolithikum ist eine *rein biologische Entwicklung*. Die Zaubermedizin konnte sich erst in der Altsteinzeit bilden, als Sprache und Verstand Vorstellungen von übersinnlichen Geschehnissen vermittelten. Unter den medizinischen Vorstellungen, die für den Aufbau der Zauberwelt von grundlegender Bedeutung waren, steht die Vorstellung, daß ein Fremdkörper «innere» Leiden verursache, an erster Stelle. Solche «Einbildungen» übten auf den Geist des Urmenschen eine lähmende, niederschmetternde Wirkung aus. Mag man heute dem Begriff des eingebildeten Leidens vielfach die

Anerkennung versagen, in der Frühzeit des Menschengeschlechtes war «Einbildung» die häufigste Ursache für schwere seelische Erkrankungen. Der Retter in dieser Not war der Zauberer, der bei der ärztlichen Behandlung mit taschenspielerischer Geschicklichkeit den Fremdkörper – einen Stein, einen Frucht-

kern, einen Wurm – zum Vorschein brachte und auf diese einfache Art dem Kranken die Gesundheit zurückgab, der auf keine andere Weise zu heilen war. In der Altsteinzeit lag ein Zwang vor, einen Weg der Heilkunst zu beschreiten, der hineinführte in das Wunderland der Magie.

Wenn's drauf ankommt:

Caramin!

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Therapeutische Erfahrungen

Psychische Alterserscheinungen bei Männern und Frauen: Perandren

Bei 12 Männern mit schweren Depressionszuständen mit Angst- und Wahnvorstellungen, sowie Suizidideen, verabreichte Verf. Perandren.

«Jeder Patient erhielt 12 intramuskuläre Injektionen *Perandren-Ciba*, der öligen Lösung des synthetischen Testosteronpropionats, das in 1 cem-Ampullen mit 5 mg Testosteronpropionat (entspr. 250 Int.-Einh.) 10 mg Testosteronpropionat (entspr. 500 Int.-Einh.) 25 mg Testosteronpropionat (entspr. 1250 Int.-Einh.) zur Verfügung stand. Für die Behandlung hatte sich ein bestimmtes Schema herausgebildet: Alle 3–4 Tage, also 2mal wöchentlich, wurde eine *Perandreninjektion* gemacht. Am Anfang der Kur wurde dazu je eine 5-mg-Ampulle benutzt, gegen deren Ende, meistens von der 9. Injektion ab, je 1 Ampulle zu 10 mg, und in besonders schweren Fällen wurde zur 11. und 12. Injektion je eine 25-mg-Ampulle gegeben.»

Das Präparat wurde stets anstandslos vertragen; als einzige Nebenwirkung trat bei einigen Kranken nach der 4. Injektion eine leichte motorische Unruhe auf. Mit oder bald nach der 12. Injektion trat der Normalzustand ein, und die Patienten konnten entlassen werden. Bei 2 Kranken bestand eine sexuelle Neurasthenie mit Impotenz. Diese Erscheinungen wurden ebenfalls beseitigt.

Perandren wurde auch bei einer Reihe von Frauen im Alter von 40–60 Jahren verwendet. Es waren insgesamt 29 Patientinnen mit schweren Depressionen, die nur zum Teil rein klimakterisch bedingt waren. Das Behandlungsschema und der Verlauf der Kur waren gleich wie bei den männlichen Patienten. Auch hier trat meist nach der 4. oder 6. Injektion als Zeichen beginnender Heilung eine leichte Unruhe in Erscheinung, dann besserte sich der Zustand allmählich, und nach der 12. Injektion konnte stets die Kur als abgeschlossen gelten. Obwohl seit Beendigung der Behandlung $\frac{1}{2}$ –1 Jahr verflossen ist, traten nie mehr Rückschläge oder Verschlechterungen auf. Von den 29 behandelten Patientinnen wurden 28 völlig geheilt. Nur eine Kranke sprach aus äußeren, nicht beeinflussbaren Gründen auf die Behandlung nicht an.

«Daß aber ein wesentlicher Einfluß auf die so erzielte Heilung den Hormongaben zuzuschreiben ist, glaube ich aus dem einheitlichen Reagieren der verschiedenen Gruppen von Patienten auf diese Behandlung schließen zu dürfen, vor allem aber aus der Tatsache, daß in vielen Fällen andere Maßnahmen psychischer oder therapeutischer Art nicht den gewünschten Erfolg gehabt hatten.»

«*Behandlung psychischer Alterserscheinungen bei Männern und Frauen mit synthetischem Testesbormon.*» Von O. L. Weiss (Aus der Krankenst. St. Paulus in Bonn-Endenisch. Ärztliche Leitung: Dr. med. et phil. O. L. Weiss). Dtsch. med. Wschr. 1939, Nr. 7.

... Es fällt mir auf, daß der in Nummer 65 «Die mittelalterliche Alchimie» auf manchen Bildern dargestellte Vogel stets als Phönix interpretiert wird. Ich glaube mich aber zu entsinnen, daß in der Alchimie auch der Pelikan eine gewisse Rolle spielte, der auch sonst als Symbol, etwa als das der Mutterliebe, gilt. Könnte es sich auf dem Bilde auf Seite 2235 unten nicht um einen Pelikan handeln, da ein Vogel dargestellt wird, der anscheinend sich mit dem Schnabel die Brust aufreißt, um seine Jungen zu nähren... Dr. O. W.

Die Interpretation des auf dem Bilde dargestellten Vogels als Phönix ist richtig. Allerdings konnten in der kurzen Legende die Gründe für diese Deutung nicht angegeben werden. Der Phönix bedeutet bei den Alchimisten entweder das Symbol der roten Farbe oder das Symbol der höchsten Vollendung und der Universalmedizin. Am ehesten wird der Zusammenhang durch folgende Stelle aus Basilius Valentinus «vom großen Stein der uralten Weisen», 4. Schlüßel, klar: «am letzten Endurteil der Welt wird die Welt durch das Feuer gerichtet werden, das zuvor aus Nichts durch den Meister gemacht wiederum durchs Feuer zu Aschen werden muß. Aus derselben Aschen wird der Phönix seine Jungen endlich wieder hervorbringen.» Hierzu findet man nebenstehende Abbildung: der Phönix steht auf Flammen, die aus Holzschreien emporlodern, und biegt seinen Kopf zu seinen Jungen herab. Dies ist die ursprüngliche Darstellung, wie sie zur Erläuterung der Stelle bei Basilius Valentinus dienen soll. Erst spätere Künstler, die das Symbol nicht mehr verstanden, machten aus den Flammen, auf denen der Phönix steht, ein Nest. Der Pelikan ist kein selbständiges alchemistisches Symbol. Bei Basilius («Von der heimlichen Wundergeburt der sieben Planeten und Metalle») wird er nur einmal im Zusammenhang mit dem Phönix genannt: «Phöbus begleitete den Mars mit einer Fahne, darauf war ge-



Phönix in dem Feuer stehend, vor ihm seine Jungen, die er aus dem Feuer erzeugt. Nach Basilius Valentinus.

malet ein Löwe auf einer Seiten und auf der andern Seiten ein Pelikan, dem schwebete ein Phönix über dem Haupt.» In dem Buch des Basilius Valentinus «Handgriffe, wie er seine Arzneien gemacht», ist auch das Symbol des Phönix als Universalmedizin wie folgt geschildert: «Zuvor ich aber solche Arznei aufschreibe, so muß ich ein wenig Erzählung tun, daß die alten Naturkündiger von einem Vogel geschrieben, welchen sie den Phönix genennet haben. Nicht daß ein solcher Vogel begreifentlich funden werde, der zur Vermehrung Jungen ausbrüte, sondern Phönix ist ein erdichteter Vogel, welcher im Feuer nimmer verbrennt, sondern sein Geschlecht (eben die auf dem Bild dargestellten Jungen!) durch das Feuer vermehrt, damit dessen kein Untergang bis an der Welt Ende gefunden werde. Darum haben die Alten diesen Vogel erdichtet und denselben unserm Stein (der Weisen), welcher zugleich eine Universalmedizin, verglichen.»

Dr. G. G.

Bei Bronchitis älterer Leute

versagen die eigentlichen Expectorantien häufig. Dagegen wirkt **Calcio-Coramin** in diesen Fällen besonders schnell, da es nicht nur die Expectorations fördert, sondern auch den Kreislauf stimuliert.

Calcio-Coramin-Tabletten (Röhrchen) Fr. 3.25 Publikumspreis, kassenzulässig

Calcio-Coramin-Taschenpackung Fr. 3.25 Publikumspreis, kassenzulässig

Die neue Calcio-Coramin-Taschenpackung ist besonders handlich

Die Altsteinzeit in der Schweiz

Das Tiefland sowie die Alpen der Schweiz waren schon in der Altsteinzeit vorübergehend bewohnt. Reiche Fundplätze der jüngsten Periode des geschliffenen Steines (Paläolithikum, im Gegensatz zum Neolithikum, der Kultur des geschliffenen Steines) wurden in der Schweiz zuerst im Kanton Schaffhausen entdeckt. Damals, zu Ausgang der letzten Eiszeit, lebten im «Kesslerloch» und im «Schweizersbild» Jägerhorden, deren wichtigstes Jagdtier das Renntier war. Sowohl beim Kesslerloch, wo die Menschen unweit eines vorbeifliessenden Wassers in einer tief in die Erde führenden Höhle hausten, wie auch beim Schweizersbild, wo sie zu Füssen einer sonnenbeschienenen Felswand wohnten, liegen Wohnstätten vor, die sich der paläolithische Mensch wegen der Nähe ergiebiger Jagdgründe ausgewählt haben mag. Seine Kultur ist gekennzeichnet durch die sorgfältige Bearbeitung des Feuersteins, den er zu Pfeilspitzen verarbeitete. Daneben stellte er Schaber, Messer und Bohrer aus sonstigem harten Gestein her, auch verstand er es, aus Horn und Knochen Ahlen und feine Nadeln zu schneiden und zu durchbohren und Harpunen für den Fischfang zu verfertigen. Für seine hohe Kultur zeugen Gravierungen auf Stein oder Knochen, wahre Kunstwerke, die das Renntier und den Steppenesel in unvergleichlicher Naturtreue darstellen. Ähnliche Fundgegenstände hob man in Höhlen des Jura vom Birstal bis zum Genfersee.

In noch ältere Zeiten zurück reichen die paläolithischen Fundorte in den Alpen. Die ältesten Siedler der Alpen schlugen ihre Wohnstätten in Höhen bis über 2000 Meter auf. In den Höhlen des Wildkirchli

am Säntis, des Wildmannisloch an den Churfürsten und des Drachenlochs ob Vättis im Taminatal wurden die Beweise für ihr Dasein dem Boden entnommen. Die in diesen Stationen gefundenen Werkzeuge sind bedeutend primitiver als die im flachen Lande ausgegrabenen Überreste der Altsteinzeitmenschen. Da hier in den Alpen der Feuerstein fehlte, so mußte sonst ein hartes Gestein, das gerade zur Hand war, zu Schabern, Messern und Bohren zugeschlagen und durch Retouchen geschärft werden. Die paläolithischen Bewohner der Alpen verstanden es schon, aus Knochen handliche und für die Fellzubereitung vorzügliche Schaber und Fleischlöser herzustellen. Sie schlugen nicht nur aus den langen Extremitätenknochen Ahlen und Schaber zurecht und polierten sie, sondern sie stellten auch aus Beckenknochen handliche Schabergeräte her. Mit diesen Werkzeugen aus Knochen und Stein vollbrachten sie schon die wichtige Arbeit des Paläolithikers, das Zurüsten der Tierhäute zu brauchbarem Leder. Mit Steinschabern und Messern verstanden sie wohl auch das Holz zu bearbeiten und Arbeitsgeräte oder Waffen herzustellen. Mit den Steinmessern zerteilten sie die Fleischstücke der auf der Jagd erlegten Tiere, um sie am offenen Feuer zu schmoren. Eine solche Feuerstelle wurde im Drachenloch in ihrer ganzen Ausdehnung aufgedeckt. Zugleich fanden sich auch in den Höhlen unter Schutt und Steinen die Überreste der Jagdtiere.

Das wichtigste Jagdwild dieser Steinzeitmenschen war den Funden zufolge der Höhlenbär, ein Riese, mehr als anderthalbmal so groß als der heutige braune Bär. Eine Jagd mit den Waffen in der Hand würde den



Das sogenannte
«Schweizersbild»
im Kanton
Schaffhausen,
eine Wohnstätte
des paläolithischen
Menschen.
Photo: Museum
für Völkerkunde,
Basel.

sicheren Tod des Jägers bedeutet haben. Man fing deshalb den Bären in Fallen und Jagdgruben, um den Wehrlosen dann mit Steinwürfen zu töten. Es waren vorzugsweise junge Tiere, die so erlegt werden konnten, wie aus den gefundenen Schädel- und Knochenresten zu erkennen ist. Außer Höhlenbären, die das Gebirge beherrschten, gab es aber auch Höhlenhyänen, Höhlenlöwen und Höhlenpanther, alles riesige Vertreter einer Tierwelt, die eher die Wärme als die Kälte liebte. Aber auch weniger gefährliche Tiere belebten die Wildnis der Alpen. Man fand Knochenüberreste von Steinbock, Gemsen und Edelhirschen, von Wolf, Dachs, Fuchs und Edelmarder, also auch von Tieren des Waldes und der Ebene. Murmeltiere und Schneehasen tummelten sich in den kälteren Regionen oberhalb des Waldgürtels.

Nach den Funden an Stein- und Knochenwerkzeugen werden diese Höhlenmenschen der Kulturperiode des sogenannten Alpen Paläolithikums zugerechnet, das in die erste Hälfte der altsteinzeitlichen Kulturen anzusetzen ist. Die Sichtung des Höhleninhaltes und die geologische Untersuchung der Fundschichten weisen darauf hin, daß diese Menschen vor der letzten Vereisung, also in der letzten Zwischeneiszeit, gelebt haben. Während diese hoch gelegenen Alpenhöhlen von Menschen besiedelt waren, hatten sich die Gletscher in die hohen Gebirge zurückgezogen; das Klima war demnach sehr mild, so daß auch Tiere, die heute in wärmeren Landstrichen leben, sehr wohl gedeihen konnten. Später aber rückten die Gletscher wieder vor, womit die wärmeliebenden Tiere zum Auswandern oder zum Aussterben verurteilt waren.

Die Überreste dieser alpinen Höhlenbewohner zeugen auch von einer gewissen geistigen Kultur: An verschiedenen Stellen des Drachenloches und des Wildmannisloches fand man mit Sorgfalt aufgeschichtete und mit Steinplatten geschützte Knochen des Höhlenbären, was als Beweis für einen der ältesten Opferkulte der Menschen gehalten wird, wie man ihn heute noch bei primitiven, bärenjagenden Naturvölkern der kalten Zonen beobachtet.

Dr. F. Schwerz, Zürich

Zeugnisse vorgeschichtlicher Kunst und Religion

sind von zahlreichen Fundstellen her bekannt. Erstaunlich ist es, daß schon aus dem Paläolithikum polychrome Felsbilder von höchster künstlerischer Gestaltung und lebenswahrer Darstellung vorliegen. Berühmt ist in dieser Hinsicht besonders die Höhle von Altamira in Spanien. Die Ausführung der dort befindlichen Bilder verrät einen solchen verblüffenden Kunstsinn, daß sie lange Zeit als Fälschung angesehen wurden. Andere künstlerische Erzeugnisse des prähistorischen Menschen bestehen in Reliefdarstellungen und Gravierungen auf Stein oder Knochen, die mit scharfen Steinmessern ausgeführt wurden. Aus diesen Darstellungen läßt sich ein Bild von der damaligen Fauna gewinnen, die sich aus Mammut, Nashorn, Höhlenbär, Löwe, Tiger usw. zusammensetzte.

Besonders interessant sind die Darstellungen des menschlichen Körpers, weil sie Aufschluß geben können über körperliche Eigenschaften des vorzeitlichen



*Relief eines Jünglings. Aurignacien. Laussel (Dordogne).
Photo: Dr. Lalanne, Bordeaux.*

Menschen und zudem einen gewissen Einblick in seine seelisch-geistige Struktur gewähren. So scheinen manche Darstellungen von weiblichen Wesen den Schönheitsbegriff des Steinzeitmenschen zu verraten. Es sei nur an die kleine Tonstatue erinnert, die nach ihrer Fundstelle im Löß bei Willendorf (Wachau) den Namen «Venus von Willendorf» erhalten hat und die ein Weib von außerordentlich üppigen Formen darstellt (siehe Ciba Zeitschrift Nr. 45, Seite 1576). Anders das Relief eines Jünglings aus der Grotte von Laussel (Dordogne), das eine fast klassische Linienführung zeigt, während eine weibliche Figur von demselben Fundort wieder sich durch sehr breite, ausladende Hüften auszeichnet, die an die Stäatopygie erinnern, wie sie unter den heute lebenden Rassen nur bei den

Beschmännern zu finden ist. Die meisten steinzeitlichen Darstellungen entsprangen sicher nicht allein künstlerischen, sondern wohl vor allem magisch-religiösen Motiven. Dies geht z. B. schon aus der Anordnung der Felsbilder von Altamira hervor. Die einzelnen Tierdarstellungen (hauptsächlich Bisons) sind regellos aneinandergesetzt, zum Teil überdecken sie sich sogar, wobei etwa auch bessere Bilder mit schlechteren rücksichtslos übermalt sind, obwohl in der Höhle genügend Platz zu anderer Anordnung gewesen wäre. Aber anscheinend waren nach magischer Anschauung nicht alle Stellen der Höhle gleichwertig und für die bildliche Darstellung geeignet. Die Bilder selbst hatten wahrscheinlich den Zweck, einen Zauber auf die Jagdtiere auszuüben. Diese Annahme wird namentlich auch dadurch gestützt, daß bei manchen Tierdarstellungen anderer Fundorte Pfeile auf den Tierkörpern gezeichnet waren. Außerdem finden sich auch Bisonsdarstellungen, bei denen das Gehörn oder der ganze Kopf fehlt, also Waffe und Hauptsinneswerkzeuge der Jagdtiere, was sich aus der magischen Zweckbestimmung der Bilder leicht erklärt.

Manche der von vorgeschichtlichen Menschen dargestellten Tiere haben zweifellos auch allgemein kultische Bedeutung, so namentlich der Höhlenbär oder das Pferd, wofür die vielen Pferdebilder in französischen Höhlen sprechen, wie man überhaupt annehmen

Relief einer weiblichen Gestalt. In der Rechten hält sie ein Horn. Ihr Blick ist dem Horn zugewendet. Das Kinn der Frau ist sehr schwach ausgebildet. Die Hüften sind fettreich und ausladend (Steatopygie). Aurignacien. Laussel (Dordogne). Plotz; Dr. Lalanne, Bordeaux.



Darstellung eines Bisons in Schwarz und Rot. Höhlenbild von Altamira (Spanien). Nach Henri Breuil.

muß, daß beim steinzeitlichen Menschen, ähnlich wie bei den heutigen Naturvölkern, alles mit magisch-religiösen Vorstellungen durchwoben war. Dr. J. J.

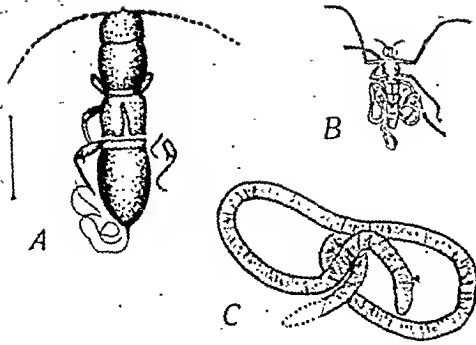
Schneebrillen

sind schon aus vorgeschichtlicher Zeit bekannt. Tonfiguren aus der Steinzeit weisen häufig ein großes brillenähnliches Gestell vor den Augen auf, das an beiden Seiten der Nase anliegt, queroval geformt ist und in der Mitte statt eines gefährten Glases einen schmalen horizontalen Spalt trägt. Ähnliche Brillen werden auch heute von den Eskimos zum Schutze gegen die Schneeblindheit gebraucht. Die Schneebrille hat nachweislich ein Alter von 4–5000 Jahren, kann aber als Schutz Einrichtung des eiszeitlichen Menschen viel höher hinaufreichen.

Dr. R. H.

Fossile Nematodenparasiten

Die ältesten Funde parasitischer Nematoden stammen einerseits aus der rheinischen Braunkohle und andererseits aus dem Bernstein der Baltischen See. Während die Braunkohle zur Zeit des Eocäns gebildet wurde (unterstes Tertiär), findet sich der Bernstein im unteren Oligocän und ist somit jünger als die Braunkohlenschicht. Beide Funde beschränken sich auf eine Nematodengruppe, die sogenannten Mermithidae, die sich dadurch auszeichnen, daß sie ihre Larvenzeit in Insekten durchmachen und dann in die feuchte Erde oder ins Wasser wandern, um dort zur Geschlechtsreife heranzuwachsen. Die Seltenheit fossiler Nematodenfunde ist in der Tatsache begründet, daß die Nematoden keine Chitineinlagerungen besitzen, weder in der Haut noch in den Eischalen. Infolgedessen zerfallen diese Würmer nach dem Tode sehr rasch, und nur zufällige, plötzlich eintretende Ereignisse, die eine Zersetzung des Körpers verhindern, können daher eine Konservierung solcher Lebewesen bewirken. v. Heydon fand 1862 in der rheinischen Braunkohle einen fossilen Käfer, *Hesthesis immortua*, bei dem gerade der 25 mm lange parasitische Wurm im Begriff ist, aus dem After herauszukriechen, während Menge 1866 im Bernstein des Baltikums 3 Individuen von 35 mm Länge an einer Chironomuslarve (Diptera) entdeckte. Bei diesem Funde sind die Nematoden noch



Fossile Nematoden. A: Heydonius antiquus aus dem After eines Käfers kriechend (fossil in Braunkohle). B: Heydonius matutinus an einer Dipterenlarve (fossil in Bernstein). C: Heydonius matutinus (vergrößert).

so gut erhalten, daß die Struktur der Haut sowie ein im Körperinnern nicht bis an das Ende reichender zylindrischer Kanal deutlich sichtbar ist; auch scheint unter 3 Exemplaren ein Männchen vorhanden zu sein, das am ausgestülpten Geschlechtsorgan erkenntlich ist. 1935 wurden beide Nematoden systematisch unter die Gattung Heydonius eingereiht mit den Namen Heydonius antiquus (v. Heydon 1862) und Heydonius matutinus (Menge 1866). Dr. H. A. K.

Zahnbefunde bei diluvialen Säugetieren

Dank zahlreicher Skelett- und selbst Kadaverfunde ist man heutzutage ziemlich genau über den anatomischen Bau einiger diluvialer Säugetiere unterrichtet, die im Leben des steinzeitlichen Menschen in Mitteleuropa eine Rolle spielten.

Nach den zoologischen Untersuchungen und Vergleichen müssen diese Tierformen als hoch spezialisiert bezeichnet werden. Erwähnenswert ist die Tatsache, daß diese Tiere gut ein Drittel größer waren als die heute noch lebenden, ihnen verwandten Tierfamilien. Die höhere Spezialisierung im Knochensystem führte oft auch zu besonderen Anomalien. So wird beim Mammut eine Deformation der Kiefer durch die am hinteren Ende abgebogenen Mahlzähne konstatiert. Auch schnelle Abnutzung der Zähne ist nachgewiesen worden. Beim Rhinoceros antiquitatis waren an den Oberkieferzähnen Crista und Gegensporn hoch hinauf verwachsen. Beim Höhlenbären sind die drei vordersten der vorderen Backenzähne verkümmert; die höchste Entwicklung zeigt der vierte vordere Backenzahn. Auch die hinteren Backenzähne hatten sich nach bestimmter Richtung hin spezialisiert. Sie zeigen eine viel ausgeprägtere und grobkörnigere Runzelung der Kaufläche als alle anderen bekannten Bärenzähne und stellen ein Extrem der Entwicklung dar, ebenso wie die enormen Größenverhältnisse des Höhlenbären. Tritt im Laufe der Zeiten eine plötzliche oder allmähliche Umgestaltung der Lebensbedingungen ein, so sterben solche extreme Formen aus, während die weniger spezialisierten Lebewesen sich eher den neuen Verhältnissen anzupassen vermögen.

Die Zähne lassen auch die Höhlenhyäne als eine hochspezialisierte Form erscheinen. Sie besaß einen einwurzeligen Molaren I max., während dieser Zahn bei andern heute noch lebenden Hyänenarten zweiwurzelig ist.

Die hier genannten Tiere sind demnach lediglich aus biologischen Gründen ausgestorben und wurden also nicht etwa vom Menschen durch die Jagd ausgerottet.

Dr. F. Schw.

Kratzspuren des Höhlenbären an Höhlenwänden

Schon in den Höhlen der Dordogne waren Kratzspuren großer Tiere, den Bärenkratzspuren ähnlich, aufgefallen. Recht deutlich traten solche Kratzspuren in der Höhle von Altamira (Spanien) in Erscheinung und konnten von H. Breuil erklärt werden. Es sind tiefe, vertikale oder schiefe Schrammen, bestehend aus 4-5 nahezu parallelen Strichen. Wenn solche Striche in nackte Stalaktitflächen eingeritzt wurden, sind sie nur schwach; sie sind aber besser ausgeprägt, wo sie auf Ton- oder Lehm Massen, die die Ecken oder Taschen der Wände ausfüllen, eingekratzt worden sind.

Neben Kratzspuren findet man auch Klauenabdrücke des Höhlenbären, was aus den Dimensionen zu erkennen ist. Das Tier hat im Finstern einen Ausweg aus den Abgründen der Höhle ins Freie gesucht und hat sich an den Felsen angeklammert. Dabei waren die Klauen unter dem Gewicht der Körpermassen wiederholt im weichen Lehm ausgeglitten, der nicht nur die Ansatzflächen der Tatzen, sondern auch die Gleittrillen und selbst die Handballen des Vorderfußes in getreuem Abdruck konserviert hat. Da der Lehm seitdem völlig hart geworden und teilweise versintert ist, liegen die Spuren direkt versteinert vor. Dr. F. Schw.

Eindrücke der Klauen des Höhlenbären in erhärtetem Lehm. Altamira (Spanien). Nach Henri Breuil.





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Follikelhormon von starker und langanhaltender Wirkung

Lutocyclin

synthetisches Corpus-luteum-Hormon
chemisch rein, gewichtsmäßig dosiert



Mixtum compositum

Der unsichtbare Schleier der Wurmsschnecke

ist ein eigenartiges, spezifisches Gebilde, das der Nahrungsaufnahme dient. Die Wurmsschnecken leben im Meer, sie sind auf Felsblöcken und Steinen festgewachsen. Es fehlen ihnen aber besondere Organe zum Nahrungserwerb, wie sie anderen festgewachsenen Meerestieren zur Verfügung stehen. Da die Wurmsschnecken durchaus nicht auf planktonreiche Orte beschränkt sind, an denen sie sich einfach durch Schlucken mit Nahrung versorgen können, sondern überall im Meer vorkommen, muß auf irgendeine Weise ein ausreichender Fang gesichert werden. Diese Aufgabe übernimmt der Schleier. Er besteht aus Schleimfäden, die von der Schnecke von Zeit zu Zeit aus der Fußdrüse ausgestoßen werden und mit deren Hilfe sie sich kleine Lebewesen herbeiholt. Die Fäden können nach Beobachtungen von Boettger bis 30 cm lang werden und sind im Wasser unsichtbar. Erst wenn eine Anzahl kleiner Tierchen an ihnen klebt, heben sie sich vom Wasser ab. Die vollbesetzten Fäden sind Perlschnüren ähnlich; sie werden von der Schnecke eingezogen und aufgefressen.

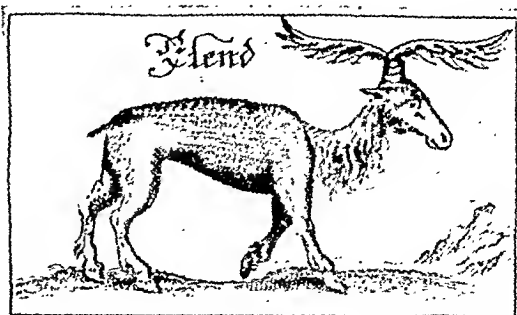
Dr. K.

Elchhufe als Mittel gegen Epilepsie

wurden in der volkstümlichen Medizin häufig verwendet. Vom Elch, an den sich seit Cäsars Zeiten eine Menge Fabeln knüpfen, ging nämlich die Sage, daß ihn die fallende Sucht häufig heimsuche und daß er nicht eher davon befreit würde, bevor er nicht die Klaue des Hinterfußes an das Ohr gelegt habe.

Diese Legende mag nach Paul Dahms durch Verschmelzung verschiedener Beobachtungen und Gerüchte entstanden sein. Einmal soll der Elch in schnellem Lauf auf der Flucht den Kopf in die Luft werfen und das Geweih waagrecht tragen, wobei er leicht stolpert. Auch greift er dann mit den Hinterläufen stark nach vorn, so daß der Eindruck entsteht, er kratze sich hinter den Ohren. Zum andern aber kratzt sich das Tier tatsächlich oft hinter dem Ohr blutig, was nach der Auffassung älterer Autoren seinen Grund darin hat, daß es beim Abwerfen der Schaufeln von Jucken gepeinigt wird, da sich unter der Haut der Geweihansätze Fliegenmaden bilden.

Es ist deshalb nicht verwunderlich, daß der Volksaberglaube die Schalen (Hufe) des Elches zu einem Heilmittel gegen Epilepsie wie auch allgemein zu einem Wundermittel stempelte. Von den einen wurden den Hufen der Vorderläufe, von den andern denen der Hinterläufe große Kräfte zugeschrieben. Man ging dem Elch mit allem Eifer zu Leibe und suchte ihn lebendig zu fangen, um sich seiner Hufe zu bemächtigen, die man in verschiedener Weise verwendete. Bald wurde aus der Hornsubstanz ein ganzer Ring angefertigt, den man am Ringfinger der linken Hand trug,



Elch (Elend). Die Hufe dieses Tieres galten als ein Mittel gegen Epilepsie. Aus dem «Thier-Buch» von Z. A. Mercklein D. Nürnberg 1696.

bald wurden Goldringe inwendig damit ausgekleidet, oder aber man faßte nur kleine Hornstücke derartig in einen Goldring, daß sie die Haut berührten.

Diese Ringe wurden besonders in Litauen angefertigt und bis nach Italien ausgeführt. Im Notfall wurde das Heilmittel wohl auch direkt an den linken Ringfinger gelegt, auch wurde es auf dem Körper, am Hals oder auf der Brust getragen. In Preußen stellte man zu bestimmter Jahreszeit und bei bestimmter Stellung der Gestirne aus den Klauen Zierate und Amulette, sogenannte «Pentacola» her. Sie hatten die Gestalt eines Herzens und wurden gegen Epilepsie und Krämpfe um den Hals getragen. An anderen Orten wurden die Hufe gefeilt und die abgefallenen Späne in Wein eingenommen. Mit der Hornsubstanz wurde geräuchert, um epileptische Anfälle und Hysterie zu beseitigen. Ferner wurde daraus ein Magisterium (d. h. ein Präparat, dessen Herstellung sehr schwierig oder dessen Wirkung sehr stark ist) angefertigt. Das durch Brennen erhaltene Pulver kam als «präparierte Elendklauen» in den Handel und wurde auch als Heilmittel gegen hysterische Leiden und Hezaffektionen angewendet.

Außer den Hufen dienten auch andere Teile des Elches zur Medizinbereitung. Besondere Wirkungen erwartete man von gebrannten Knochen, vom Blute und vom «Herzknochen», einer örtlichen Verhärtung in der Scheidewand der Herzkammer. Neben den Klauen hielt man auch Geweih und Nerven für besonders wirksam. Das Geweih schnitt man, solange es noch jung und blutreich war, in Scheiben, digerierte diese mit Kreuzwurzsaft und Spiritus und stellte so einen Trank her, den man Personen reichte, die von Schlangen gebissen waren. Um den 1. September herum (die Zeit der Brunst) sollte das Geweih besonders heilkräftig sein. Gallerte, «Gallrey», aus Geweihsubstanz hergestellt, wirkte vorzüglich gegen «hitze Haut-Schwachheiten». Aus dem Geweih gefertigte Ringe wurden gegen Kopfschmerzen, «schwere Not» (Epilepsie?) und Schwindel getragen. Der Nerv des Tieres wurde gedörrt und um ein vom Krampf befallenes Glied gewickelt. Er sollte den Krampf stillen und jede Wiederkehr des Übels verhüten. Dr. R. H.

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GEORGE ROSEN, M.D., Editor



A CHRONOLOGICAL HISTORY OF SALERNO

- 8th Century B.C.**—Southern Italy colonized by the Greeks. Great cities are founded: Sybaris, Croton, Tarentum. The philosopher and mathematician Pythagoras flourishes in Southern Italy during the 6th century, the philosopher Zeno during the 5th century.
- 196 B.C.**—The Romans finally conquer Southern Italy and make it a colony (Magna Graecia). From the 1st century B.C. on, the city of Salerno is mentioned as a seaside resort by Roman writers, particularly Horace and Pliny.
- 500 A.D.**—Salerno becomes a bishopric.
- 568**—The Longobard King Alboin occupies the city, which until then had first belonged to the Ostrogothic Empire, and had later become a Byzantine possession for a short time under Emperor Justinian (527-565).
- 644**—Salerno comes under the rule of the lords of Benevento. At the end of the 7th century a Benedictine monastery is founded in Salerno. In all likelihood the beginning of the "School of Salerno".
- 849**—After the downfall of the Duchy of Benevento, Salerno becomes the chief city of a principality that belongs first to the Frankish Empire and later to the German. During the 9th century the physicians of Salerno are already famous.
- 974**—Salerno becomes the seat of an archbishop.
- 1075**—Salerno together with all of Southern Italy comes under the dominion of the Norman Robert Guiscard. The Norman rulers increase the reputation and the wealth of Salerno.
- 1084**—Robert Guiscard builds the Cathedral of San Matteo, one of the most beautiful churches of Southern Italy.
- 1130**—Salerno is incorporated into the Kingdom of Naples and Sicily.
- 1140**—King Roger (1130-1154) issues a decree requiring an examination before permitting the exercise of the medical profession. His court is under Arabic influence.
- 1154-1190**—William I (1154-1166) and William II (1166-1189), rulers of Naples and Sicily favor the Arabic influence. The contemporary Holy Roman Emperor Frederick I, Barbarossa (1152-1190) orders translations of Arabic works in Toledo. Large medical schools exist in Salerno in the middle of 12th century.
- 1194**—The Kingdom of Naples and Sicily, to which Salerno belongs, comes under the rule of Emperor Henry VI (1190-1197). Unrest prevails among the inhabitants of Salerno.
- 1195**—Henry VI sends a punitive expedition against Salerno which is partly destroyed. Many scholars leave the city as a result and carry their knowledge abroad.
- 1220**—Emperor Frederick II (1215-1250) becomes King of Naples and Sicily. He has Arabic authors translated into Latin. The School of Salerno is taken over by the state.
- 1240**—Frederick II issues a decree regulating the study of medicine. The University of Naples founded by him in 1224 becomes a rival of the School of Salerno.
- 1250-1266**—The sons of Frederick II, Konrad (1250-1254) and Manfred (1254-1266) rule over Salerno in succession. Both are adherents of Arabic culture.
- 1266**—Salerno comes under the rule of Charles of Anjou (1266-1285) who continues the Arabic trend. He commissions a Jewish physician educated at Salerno to translate the "Continens" of the great Arabic physician Rhazes (*ca.* 850 to *ca.* 932).
- 1442**—The house of Aragon conquers the kingdom. Gradual decline of Salerno.
- 1504**—The Spaniards conquer Salerno.
- 1713**—The Austrian Habsburgs receive Salerno as part of their booty in the War of the Spanish Succession.
- 1808**—Joseph Bonaparte, the brother of Napoleon, conquers Salerno. Rapid modernization.
- 1811**—Napoleon closes the School of Salerno.
- 1815**—The Congress of Vienna returns Salerno to the Habsburgs.
- 1846**—The medical historian A.W.E.T. Henschel discovers the *Compendium Salernitanum* in a library in Breslau.
- 1852**—Salvatore de Renzi publishes the Salernitan manuscripts as *Collectio Salernitana* at Naples.
- 1860**—A plebiscite decides that Salerno join Italy.

THE BEGINNINGS OF THE SCHOOL OF SALERNO

DR. A. G. CHEVALIER

FROM THE DEATH of Galen (*ca.* 201 A.D.) to the appearance of Vesalius there was no scientific progress in medicine. Essentially the Middle Ages took over the legacy of Antiquity without adding anything new. The Hippocratic writings still formed an inexhaustible source and for a long time played a decisive rôle in the practice of medicine. Next to Hippocrates, Galen (131-201 A.D.) was the authority for later generations; in his works the doctors found the Hippocratic teachings as well as those of the other medical schools. In this way their knowledge was increased, but there was no further development of medical science.

In part the standstill of medicine was due to the circumstance that the centres of science

shifted with the change of political conditions. Athens, Alexandria, Rome, Byzantium succeeded each other as centres of political and scientific life.

This was favorable for medicine insofar as the scientists of different schools contributed various bits of knowledge and stimulated study, but for the most part the activity of these epigones was restricted to the composition of commentaries, glossaries, encyclopedias, and compendia. Alongside these writings popular medical works also spread the medical knowledge of Antiquity.

While the legacy of Antiquity was carried on by Byzantium, the capital of the Eastern Roman Empire, during the period of the barbarian migrations and the early Middle Ages, and transmitted thence to the West, the wisdom and knowledge of Antiquity was also taken over by the Arabs, who transformed it and later transmitted it to Europe.

For the beginnings of Salerno it is especially significant that like all of Southern Italy it belonged for a time to Byzantium, that is, to the Eastern Roman Empire, the only state where during the confusions of the barbarian migrations there were schools, libraries, trained physicians, and medical writers. It is furthermore significant that in Southern Italy the cultivation of ancient science had never been entirely interrupted, and that the Longobards who had settled there since 568 understood how to conserve and to advance the culture already existing in the conquered countries. At any rate, de Renzi in his history of the School of Salerno relates that at the time of the Longobard rulers there are supposed to have been many physicians in Italy, some of whom bore the title *Magister scolae*. It may be assumed that among them were also some from Salerno.

Hippocrates in the dress of a medieval physician. From the *Prognostica* of Hippocrates. Greek manuscript *circa* 1400. Bibliothèque nationale, Paris.





Galen with his students.
 From the *Opera varia* of
 Galen. Latin manuscript of
 the 2nd half of the 15th
 century.

The circumstance that Salerno was an episcopal see since 500 A.D. can likewise be regarded as a favorable factor for the intellectual development of the city, as during the early Middle Ages schools were founded and developed where bishops had their residence. More important, however, is the founding of a Benedictine monastery at Salerno (end of the 7th century); it was one of the duties of the Benedictine Order to cultivate the sciences. Thus they were expressly ordered to study Hippocrates, Galen, Aurelian, and other medical writers. The presence of Jewish physicians — Jews had lived there since Roman times—the favorable climate of Salerno that attracted sick people and convalescents, and the presence of the miracle working relics of a saint, all contributed to make medicine the center of intellectual life in Salerno, so that even though philosophy and jurisprudence are also supposed to have flourished there, it became known simply as "civitas hippocratica". It is noteworthy that in Salerno clerics and laymen, natives and foreigners, men as well as women practised medicine.

We do not know how and when the physicians of Salerno united to form the "Collegium hippocraticum", nor is there anything known about the origin of the

medical school, which was conducted by laymen at a time when all learning was almost exclusively in the hands of the clergy. This is proven by documents in the Neapolitan archives, for we find men and women, priests and Jews listed together. Indeed, of some of the school heads, it is expressly stated that they were married.

Even during the Middle Ages it was no longer possible to obtain any precise information about the founding of Salerno, and during the following centuries it became completely legendary. According to an ancient chronicle the school is supposed to have been founded—we are not told when—by four doctors of different origin: a Greek, a Latin, a Saracen, and a Jew, each of whom lectured to his countrymen in their own tongue. Although this legend does not actually answer the question of the origin of the school, it is very illuminating because it indicates the international and tolerant character of the school of Salerno, which decisively influenced its development and to which it owes its great significance. As there is a lack of documentary evidence, the views on the beginnings of the Salernitan school vary greatly. Some maintain that it was founded by Christian refugees from Alexandria (644), others that it was their oppressors the Arabs, still others that Charlemagne

(742-814) was the founder, and finally that it was called into being by the Benedictine monks. According to the results of recent medico-historical research, however, the School of Salerno was not "founded", but arose gradually and developed organically.

Be that as it may, according to the statements of Alpanus, physician and poet to the Archbishop of Salerno (11th century), medicine was already highly developed there during the 9th century, and at the same

A column from the work of Trotula, *De sintomatibus mulierum*. From a collection of Latin medical writings of the 14th century. Bibliothèque nationale, Paris.

Diabitus et iusticie. Insuper sit iusticia et misericordia.
Cum ad hoc mundum venisset
 et in prima mundi con-
 uersione reru naturis
 singulis circa generis
 suum distinguere supra
 cetis humana et singulis
 digne colebantur. Cum su-
 pra cetis alium addicione
 rationis in intellectu liber-
 tatem et eius propria uoluntate
 subiecte gereretur. Secun-
 dispari principium aduersus
 futurum labali propugnare pro-
 uida plubatione dispelantur
 quia masculinum et feminam cre-
 auit eos. et ex eis fructus et
 merces fructibus eius con-
 pitiones generis quanta co-
 mitione coniungunt naturam
 et masculinam sic constituit
 Sed ne uynus malitiam mas-
 culi hideretur. Opponitur fru-
 gantia et hu multu abelu-
 mino uoluntate coheret. Secun-
 ex aut quatuor et. et sic
 uero uipula per digna uenit
 buer. Ut mulieret. et fructus
 buer et hu. ut per per

time the records of the city of Salerno already mention physicians, in 848 a certain Josep, in 855 a "Josan medicus". Thenceforth there is repeated mention of Salernitan physicians, some active in Salerno itself (Ragenfried about 950, Grimoald about 1000 A.D.), others at foreign courts, e.g. at the court of Louis IV of France (936-954). At the same time there are reports of patients who came from afar to seek help in Salerno, e.g. Adalberon, Bishop of Reims, in 984, Desiderius, then Abbot of Monte Cassino, later Pope Victor III (1086-1087), Bohemund (1065-1111) son of Duke Guiscard, and Robert, son of William the Conqueror (1027-1087). How widely known Salerno was in the medieval world may be seen from references in literature. The German minnesinger Hartmann von Aue has his hero, poor Heinrich who is a leper, wander to Salerno together with the girl who loves him, and the Frenchman Ruteboeuf (13th century) scoffs at Salernitan physicians and conditions in his satirical poems.

According to the statements of Odericus Vitalis, a historian of the 12th century, there were large medical schools in Salerno in the middle of the 12th century: "Maximae medicorum scolae ab antiquo tempore habentur". Vitalis also relates of the great fame of the physicians there, a fact confirmed by the Jewish traveller Benjamin of Tudela who visited Salerno in the 12th century, as well as by the unknown author of the *Carmen archipoetae de itinere Salernitano* which was composed about 1162 at the court of Bishop Reinald of Cologne. On the basis of all these facts one may perhaps suggest that in the beginning Salernitan physicians following the example of Antiquity instructed students in their own homes, that a common school later replaced the private schools, and that not until then did the physicians organize into associations like the guilds.

At any rate this school existed in Salerno in the 11th century and had ten teachers,



A man collecting medicinal balsam from a tree. From a French translation of the Salernitan Platearius, 15th century. Bibliothèque nationale, Paris.

was ascribed to Galen! Today this work is still of some interest because it throws light on the teachings and conceptions that prevailed in Salerno at that time. Without the author being aware of the contradiction, the *Passionarius* contains a mixture of Hippocratic and Galenic doctrines combined with those of the Methodists in such a way that the Methodist doctrines predominate. In this way Gariopontus who is described as a follower of Hippocrates spread a doctrine opposed to that of Hippocrates. Nevertheless, he deserves to be called a follower of Hippocrates. The gift for observation that he shows in his descriptions of diseases and his vivid portrayal reveal the truly Hippocratic spirit.

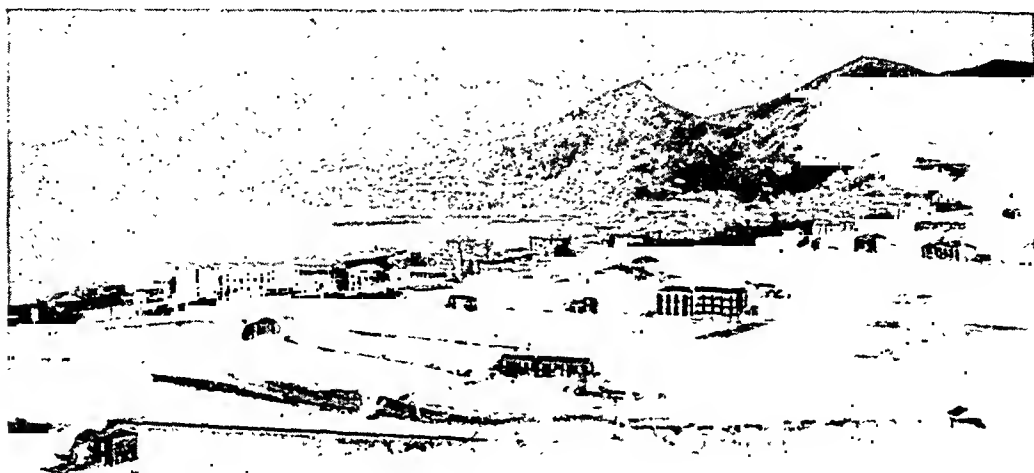
Petroncellus, an older contemporary of Gariopontus, is also to be regarded as Methodist. He is the author of the *Practica*, a book which as the title indicates is chiefly occu-

pled with therapy. The fact that this work already appears in English versions during the 12th century characterizes the significance that the Salernitan writings possessed for medieval Europe.

More famous than these two scholars is Trotula. She too probably lived in the 11th century, one of those women who studied in Salerno and then practised medicine. Medical historians do not agree as to whether Trotula was actually a physician. Some describe her as a midwife, others go even further and doubt that the famous Trotula ever lived. Trotula was presumably descended from one of the noblest families of the land. Perhaps she was the wife of the physician Johannes Platearius the Elder and the mother of a famous medical author, Mattheus Platearius.

The remark of Odericus Vitalis that when the German scholar Mala Corona (Rodulfus) visited Salerno (about the middle of the 11th century) he found only one person, a woman, who was able to hold her ground in a discussion of scientific problems, seems to refer to Trotula. Trotula is also found among the seven authors whose teachings are contained in the *De aegritudinum curatione*, the encyclopedia of Salernitan medicine published in the 12th century. Her reputation was so widespread that as late as the 15th century Johann Hartlieb, personal physician to Duke Sigismund of Bavaria, edited the writings of Trotula for the Duchess.

The works of Trotula that have come down to us appear to justify her fame. In her work *De compositione medicamentorum*, which deals chiefly with the care of the skin, she shows a great gift of combination, and her book *De mulierum passionibus ante, in et post partum*, which provides the first contribution to gynecology since Soranus (first half of the 2nd century) reveals a very agile mind. Although her book contains a good deal that has no connection whatsoever or only a very tenuous connection with its sub-



Present-day Salerno seen from the east. In the left background above the Gulf of Salerno is Monte St. Angelo (1443 m).

ject, e.g. the raising of children or the development of speech, and while it mentions obstetrical and therapeutic procedures based on superstition, yet Trotula deserves credit for having again elevated to the rank of a medical discipline a field which for centuries had been left entirely to midwives. The significance of her work is increased by the fact that in the chapter on the delivery of the child she mentions the protection of the perineum, a procedure already known to Soranus but which had probably been forgotten in the interim, and that she recommends perineorrhaphy in cases of a complete laceration of the perineum. Trotula wrote not only on gynecology, however, but also on other branches of pathology. The seriousness and loftiness of her ideas confirm the statement of Plato that women are just as suited for medicine as are men, a statement with which the historian Mazza justifies the fact that women were allowed to practise and to teach medicine at Salerno. By and large, however, everything in the works that certain medical historians ascribe to Trotula, as well as in those of her contemporaries Gariopontus and Petroncellus was only a reproduction of the teachings of classical

medicine. And how could it have been otherwise when the strong hand of authority weighed so heavily on intellectual life!

As far as the medical works of Antiquity were available to them, Gariopontus, Petroncellus, Trotula, and the Salernitan archbishop Alphanus (died 1085), the author of a hippocratic-galenic treatise *De quattuor elementis corporis humani*, dealt exhaustively with them. The anonymous *Speculum hominis* which appeared at this time likewise contained nothing new. Isidorus, bishop of Seville, who lived about 600 and who is cited in the *Speculum*, was himself a compiler. There is no evidence of any independent scientific research in this work. The anonymous author says himself: "Quae mea metra serunt, aliorum prosa fuerunt. Prosam imitavi, quia metrum plus placet auri". (Because rhymes are more pleasing to the ear, he says in verse what others before him have said in prose.)

This first didactic poem of the School of Salerno could easily have been its last. For medicine in the West, which had begun to develop in Salerno, appeared on the verge of dying again for lack of new knowledge and ideas.

CONSTANTINUS AFRICANUS AND THE INFLUENCE OF THE ARABS ON SALERNO

DR. A. G. CHEVALIER

THE LEGACY of Antiquity was also kept alive outside of Europe. The Arabs who had come into contact with Hellenism through their conquest of Persia and Egypt rapidly assimilated the Greek culture. Under the rule of the Caliphs many Greek authors, including all the important medical authors, were translated, so that by the end of the 9th century there was no larger scientific work that had not been translated into Arabic. Furthermore, all the medical writings produced by the Arabs themselves, the writings of Albuhasim (10th century), Rhazes (ca. 850-ca. 932), and the Canon of Avicenna, are all based on the knowledge of the Greeks.

Nevertheless, the intellectual legacy of Antiquity was not accepted passively by the Arabs, but was completely transformed. Medicine now became a unified theoretical structure, so that it was possible to derive individual propositions in an almost mathematical manner. It was not experience, nor Hippocrates which were dominant, but rather the more speculative Galen. That this arabicized version of ancient medicine met with a favorable reception in Salerno and consequently throughout the West is due to Constantinus Africanus. His personality has always been much disputed. Even during his own lifetime opinions varied greatly. By some he was glorified as "Magister orientis et occidentis", by others he was abused as "Monachus insanus". And even though various medical historians regard him unfavorably as an unscrupulous plagiarist and unreliable translator, yet by translating Arabic works into Latin for the first time he gave the young Salernitan medicine a chance for further development. Beyond that, however, he represents a turning point in the relations between Orient and Occi-

dent, for his translations introduced a period in which the West became receptive to Arabic influence.

Constantinus Africanus was born in 1018 in Carthage. He devoted himself to medicine at an early age, and like the Greek scientists set out on travels that took him to the Orient, to Mesopotamia, and India. After his return he felt himself a stranger in his native city, so that he soon left Carthage again and went to Byzantium. Several years later he came to Salerno, but he did not stay there long. He withdrew to the Benedictine monastery of Monte Cassino. Here he died in 1087.

Constantinus's activity consisted in the translation of Arabic originals or of Arabic-translations of Greek texts. When in the course of his translations he often omitted the name of the author or even put his own in its place, he did this as he explained so that thieves should not be able to steal his property! For a long time his *Pantechne* (Pantegni), a Latin version of the so-called royal handbook (al-malikī, regalis dispositio) of the Persian Ali ibn al-Abbas al-Magūsī, personal physician to the Emir of Bagdad (10th century), played a leading rôle in medical literature. It contains ten books each dealing with the theory and practice of medicine.

Even though Constantinus did not translate the most important works of the Arabs, and only a few short tracts of Hippocrates and Galen, yet he introduced the golden age of Salerno and the most productive epoch of all medieval medicine.

To the bent for facts and for simplicity in the treatment of disease and in the presentation of medical theories which had always been developed in Salerno, there was now added, under the influence of the newly

rial according to a definite principle, that is according to the functions of the parts of the body. Thus they treat of *membra animata* (brain and nerves), *membra spiritualia* (heart, lungs, arteries, ribs, etc.) and *membra naturalia*, subdivided into the *membra nutritiva* (stomach, liver, etc.) and the *membra generativa* (sex organs).

All the anatomical text books of the period after Constantinus are influenced to an extreme degree by his translations, as evidenced by the nomenclature employed, which goes back to Galen and Ali Abbas (died 994).

It is also due to Constantinus that surgery became a scientific discipline. This is all the more remarkable because the Arabic physicians had hardly practised surgery. Like the Christian physicians they avoided the shedding of blood on religious grounds. They likewise believed in the resurrection of the body and therefore avoided surgical intervention wherever possible. When it was unavoidable the Arabs used the cautery in place of the knife. Christian medicine prior to Constantinus was unacquainted with this method and left surgical procedures to both house keepers and charlatans, while the learned doctors, as shown by the great encyclopaedia of internal medicine *De aegritudinum curatione* (12th century), remained content with salves, decoctions and

poultices even in cases requiring surgery.

To be sure, at a time when the Crusades brought many wounded soldiers into the land surgery developed under the spur of necessity, but it was not until the appearance of the *Practica chirurgiae* (1180) of the Salernitan surgeon Roger Frugardi that it ceased to be simply a handicraft. This work is the oldest surgical book of Christendom and like the *Chirurgia* of Jamatus (Jamerius) of Salerno (end of the 12th century) the treatment and presentation of its profuse material are based on Constantinus. Furthermore, the *Chirurgia Jamerii* was rightly described by Guy de Chauliac as "chirurgia brutalis".

In addition to their immediate field (fractures, wounds, hernia, stone, fistula, cancerous ulcers, and abscesses), the *Practica* of Roger, known in the revision of his pupil Roland of Parma (produced about 1240), and in a similar manner the *Chirurgia* of Jamatus also deal with skin diseases, ranging from harmless rashes to leprosy, and even with psychoses and epilepsy, probably because cauterization which was used against the latter diseases was regarded as a surgical procedure. They also discuss trepanations and ablation of the thyroid by means of the seton (which was performed when the conservative treatment of goiter with seaweed had been of no avail). Anaesthesia was known; sponges saturated with narcotic plant juices were held before the patient's nose. Hemostasis was effected by ligation, cautery or hemostatic medicaments. To what degree surgical technique had been developed in Salerno at this time may be seen from the fact that in an abdominal wound the torn intestine was sewed together over an elderwood tube, or the trachea of an animal, which was placed in both ends of the intestine.

The specific character of Arabic medicine, its speculative character and logical subtlety, finds much greater expression in general medicine than in anatomy and surgery. The immediate pupils of Constantinus, Johannes

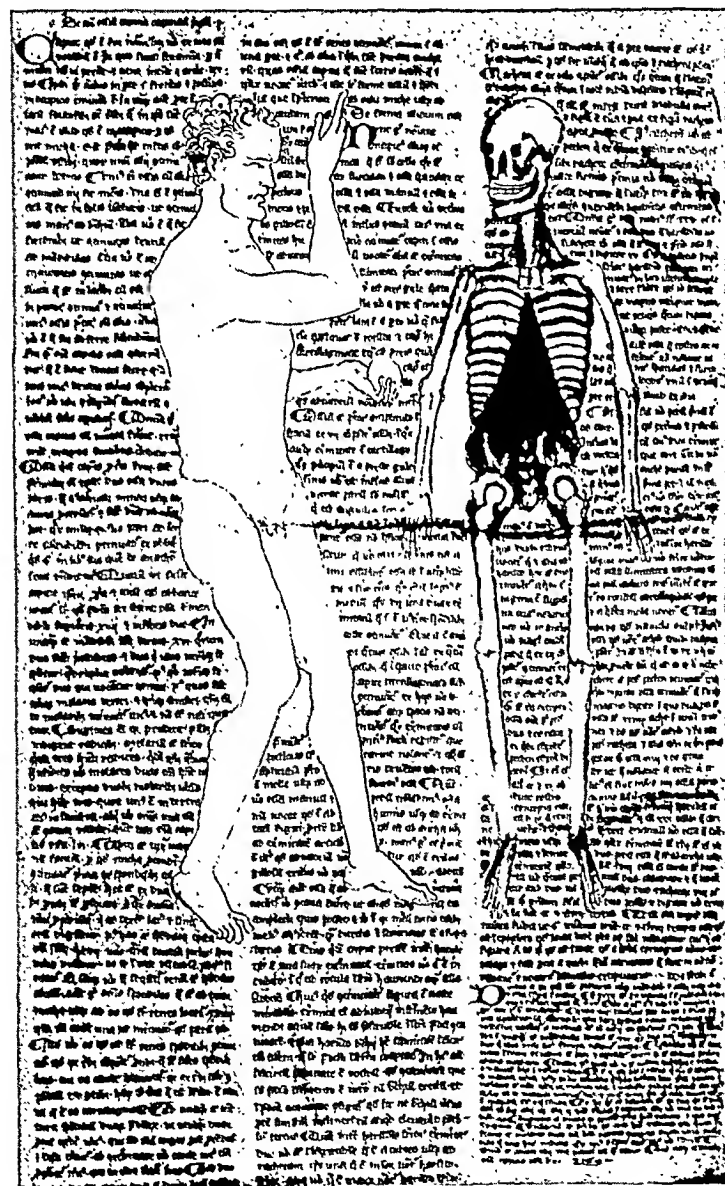
The Benedictine monastery of Monte Cassino where Constantinus Africanus worked. Built in 529, it was destroyed in 1349 and rebuilt in 1557.



Afflacijs (1040-1100), called Saracenus, and Bartholomeus who probably lived at the same time reveal these characteristics of Arabic thought in their works.

Afflacijs wrote *Curae de febris et urinis*, the first of the tracts on urine which were later to become so numerous. Bartholomeus wrote the famous *Practica* (the full title is *Introductiones et experimenta in practicam Hippocratis, Galieni, Constantini*

graecorum medicorum), which was translated into many languages and formed a basis for many later pharmacopoeias. Derivation of a complete nosographic picture from the almost imperceptible sound of the pulse and the character of the urine corresponds to the predilection of the Arabs for differentiations and analogies. Hippocratic semiotics is very different from that of the Arabs. Despite all attention to details, obser-



Adam with the apple in his left hand threatens death. Page from a Latin manuscript of the *Anatomy of Rhazes*.



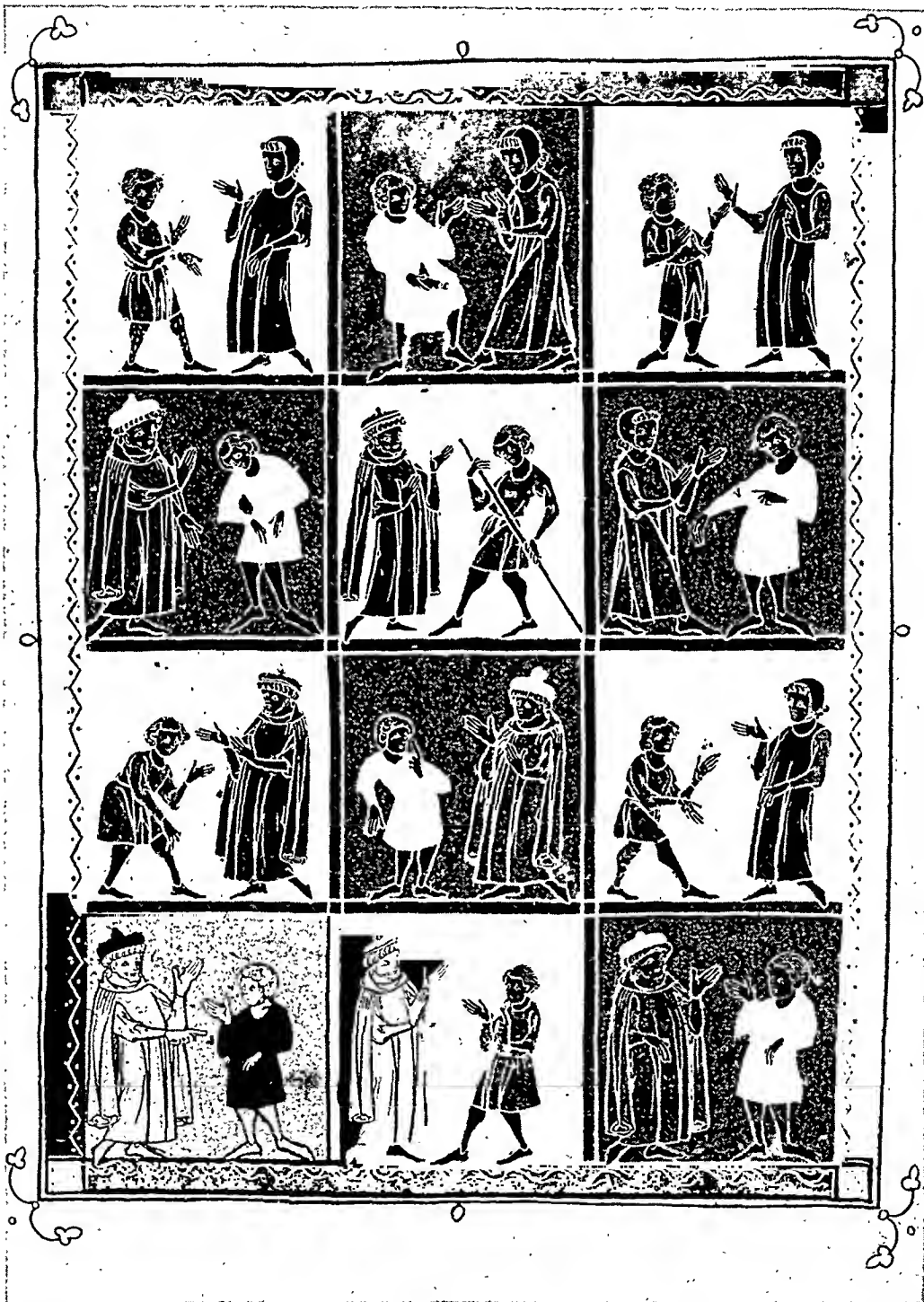
A scene from the *Surgery of Roland of Parma*. The Latin inscription reads: "Magister reducit intestina in corpus calefaciendo cum catulo". 13th century.

vation as taught by Hippocrates was directed toward the total impression. The Arabic approach, however, was decidedly speculative. The pulse was classified into species, genera and sub-genera, and the urine was examined for color, density, quantity, and turbidity, whereby the nineteen colors that were differentiated were ascribed to changes in the affected humors, and the position in the urine glass where the turbidity occurred was assigned to a corresponding region of the human body.

The alien spirit that was stirring in the new therapy was too much opposed to the Hippocratic simplicity which had prevailed in Salerno before Constantinus to become dominant immediately. The *Antidotarium Nicolai Salernitani* with its 137 complicated prescriptions (since the 16th century it was ascribed to a Nicolas Praepositus, probably through confusion with Nicole Prévost of Tour, who lived around 1500) was followed in the middle of the 12th century by the supplementary works of Mattheus Platearius the Younger, the *Glossae* and the *Circa instans* (so called because of the first words with which it starts: its title is *De simplici medicina*) in which the author limits the use of the new medications considerably

without avoiding them completely. Similarly the *Compendium* of Magister Salernus (ca. 1130-1160), who discusses the preparation and mode of action of medicaments in the manner of the Arabs, was simplified in the commentary of Bernardus Provincialis (produced around 1150-1160). Furthermore, the delightful little treatise of Petrus Musandinus (middle of the 12th century), *Summula de praeparatione ciborum et potuum infirmorum* with its gastronomical interest, expressly introduces the Hippocratic approach into the new treatment with medicaments by taking into consideration the mode of life and by emphasis on the importance of an appropriate diet.

In the struggle between the unadulterated Greek influence, that had formerly prevailed in Salerno, and the Arabic influence that began with Constantinus, the Greek still had the upper hand in the 12th century. The principle: "Natura est operatrix, medicus vero minister" was still held in high regard in Salerno. Simplicity in the treatment of patients and reliance on common sense and facts in the presentation of medical theories still predominated. Two books written in Salerno in the 12th century became classics, the *Regimen sanitatis Salernitanum*,



Medieval miniatures showing scenes in a doctor's office. The doctor is characterized by the long robe and the cap. From the French translation of the pharmacology, *De simplici medicina*, of Mattheus Platearius II (end of the 12th century). Sloane manuscript No. 1977, *British Museum*.

the first textbook of the Salernitan tendency, and the *De aegritudinum curatione*, a compendium of internal medicine.

Meanwhile the Arabic influence grew ever stronger, especially as the Kings of Naples and Sicily to whom Salerno belonged, from Roger II (1130-1154) on, were very favorably disposed to Oriental culture. Just as the Caliphs had once had Greek works translated into Arabic, now the Norman kings commissioned learned Jews to translate Arabic authors into Latin. In this way the works of Rhazes and Avicenna became known towards the end of the 12th century. Another favorable circumstance was that since the regulation of 1240 medicine could be studied only after having passed a three-year course in philosophy, a circumstance which was peculiarly favorable for the acceptance of Arabic medicine with its abstract thought and dialectics.

The impression produced by the works of the Arabic authors was tremendous. The profusion of facts in the *Continens* of Rhazes, a collection of excerpts from Arabic and Greek authors, and even more the clear and logical presentation of Avicenna (908-1037) who based all medical knowledge on Galen and Aristotle and erected a complete structure on this foundation, captivated the West. The opposition of the earlier Salernitan trend grew ever weaker. One of the last opponents of the Arabic influence was the Salernitan, Giovanni di Procida of Palermo, personal physician to Frederick II. At the beginning of the 14th century the old Civitas Hippocratica was already completely under the influence of Arabic medicine. From now on Salerno was dominated by the attitude expressed in the statement of Rhazes that it is more important for a physician to read a hundred books than to see a hundred patients.

The result of this complete subjection to an alien spirit was the gradual decline of the School of Salerno. It became literarily sterile, the number of students decreased continuously, and Salerno lost its attraction, par-

ticularly as the art of dialectic was much more highly developed at the schools of Bologna and Paris that had arisen in the meantime. The School of Montpellier (CIBA SYMPOSIA, Vol. 2, No. 1, April, 1940), the oldest medical school of the west after Salerno, was now also superior to it, and in the case of the newly founded University of Naples (1224) an important factor in its favor was that Naples was likewise the royal residence.

At the end of the 14th century the Italian poet Francesco Petrarca (1304-1374) speaks of Salerno as of something that was past: "Fuisse medicinae fontem Salerni fama est". Actually the School of Salerno no longer "lived", although it continued to exist for centuries and still trained doctors. In 1811 Napoleon ended its existence by officially closing it.

On the other hand, however, the spirit of ancient Salerno lived on in other countries. It spread far and wide in Europe, and remarkably enough from Paris whither it had been transplanted at the turn of the 12th to the 13th century by Gilles de Corbeil, a student of Salerno, later professor of the medical faculty of Paris and personal physician to the French King Philip August (1180-1223). Furthermore several authentic Salernitan works were repeatedly translated into other languages and studied, above all the *Surgery* of Roger, which was commented on by the "Four Masters" (Glossulae 4 magistrorum super chirurgiam Rogerii et Rolandi) in the 13th century. For a long time it continued to serve as a handbook for surgeons.

Here we should also mention the *Anatomia porci*, of which traces are to be found in many anatomical and surgical textbooks of the subsequent period; also the *Practica* of Bartholomeus, which was popular even in distant Denmark; the *Antidotarium* of Nicolaus Salernitanus, which became the standard pharmaceutical textbook of the later Middle Ages; the work *De aegritudinum curatione*, and the *Regimen sanitatis*.

THE "REGIMEN SANITATIS SALERNITANUM"

DR. A. G. CHEVALIER

PROBABLY few books, aside from religious works, influenced the mode of life of the European peoples for centuries as greatly as the so-called *Regimen sanitatis Salernitanum*, the Salernitan directions for health and long life. This work appeared in the 12th century, during Salerno's most flourishing period and was published in England, Italy, and Germany as late as the middle of the 19th century, that is, at a time when the School of Salerno was known only to a small group of specialists. The *Regimen* appeared in more than 140 editions. At first it was spread in manuscript, then as incunabulum, and later as a cheap, popular book. Nor was its popularity restricted to any one country; it was translated into almost all European languages, several Asiatic tongues and even into some dialects.

Charles-Victor Daremberg (1817-1872), the French medical historian and one of the first investigators of Salerno, calls the *Regimen*, which was also known as the *Flos* or *Lilium Medicinae*, a work of medical rhapsodies. Actually, only this conception does justice to a book, which appeared without anyone knowing when and by whom it was written and which constantly changed and grew over a period of centuries. The first edition was issued by Arnold of Villanova (*circa* 1238-1311). In most of the manuscripts that have been preserved it numbers 362 verses, in some there are more, in some less, so that the Villanova editions vary between 269 to 389 verses. Actually, however, only the version in 364 verses annotated by Villanova which appeared about 1300 can be utilized historically. Some of the later versions contain more than 1200 verses, but it is impossible to determine the time and origin of the individual additions. In 1852 de Renzi gathered all the available verses of the *Regimen* into his *Collectio Salernitana*, thus attaining a

total of 3256 verses, almost ten times the original number. Various textual discrepancies and differences of style have crept into the *Regimen* so that it reminds one of the folk epics which are the work of many generations and whose parts appear to belong to different worlds. Not only a single people, but rather an entire continent deposited its experiences in the *Regimen* and clung to it in its fear of sickness and death.

According to the most widespread tradition, the *Regimen* was composed by the entire School of Salerno for the Norman prince, Robert, son of William the Conqueror (1027-1087), who came to Salerno in 1101 to receive treatment there for an arm wound. The Salernitans were convinced that Robert would inherit his father's throne (which did not occur). It is for this reason that the dedication contains the phrase: "Anglorum regi scripsit tota schola Salerni".

In some versions the dedication contains the word "francorum" instead of "anglorum". As Salvatore de Renzi (Naples, 1800-1872) says in his history of the school of Salerno, some scholars believe that this dedication refers to Charlemagne. This opinion is based on a codex located in England, which speaks expressly of verses dedicated to "Carolo Magno francorum regni gloriosissimo". There are also editions in which the dedication is completely lacking, and manuscripts that mention two unknown persons, John of Milan and Johannes de Novo Foro, as the authors.

Other medieval medical faculties also composed a "Regimen" like the Salernitan, as the success of this work was enormous. Even before the invention of printing it had already appeared in 24 editions. In the 13th century the French physician and poet, Gilles de Corbeil, speaks indignantly of a *Regimen* of the School of Montpellier. In 1477 this school issued another one, and

Regimen sanitatis salerni



**Quenale reperitur parisi sub iter signio dñe
Laudii vicil sancti Jacobi.**

Title page of a Latin edition of the *Regimen of Salerno*, dating from the beginning of the 16th century, probably printed in Paris.

in 1519 the Paris Faculty also published a "Regimen". Yet none of them could compete with the popularity of the Salernitan work. The seductive quality of the verse undoubtedly played a certain part in this popularity. Verses such as "*Cum locus est morbis, medico promittitur orbis*" are easily remembered. Above all, however, the Salernitan *Regimen*, which dates from the Greek period of Salerno, still exhibits the simplicity and closeness to daily life that appealed to the masses far more than the dialectic of the scholastic medicine of Paris.

Originally the *Regimen* seems to have been a manual for the hygiene of daily life. In one of the early German translations it is characterized in the following manner: "This booklet tells how to care for one's

health in every month of the year". As a consequence of the ever-increasing interest in scientific theories which resulted from the influence of Constantinus Africanus, the *Regimen* was provided with a theoretical underpinning.

The complete edition in the *Collectio Salernitana* contains ten parts, each dealing with a different field of medicine. The following review of the teachings and views of the *Regimen* deals only with a few especially interesting subjects.

Hygiene

The path that leads to health and long life is repeatedly explained in detail in eight chapters. Whoever wishes to live long, it is stated, must live "like an old man" ahead

of his time. The old Greek principle of moderation is preached with an array of means that is comprehensible only when one remembers how foreign the principle of moderation probably was to medieval man with his overflowing vital energy.

The mode of life is indicated for every season of the year and in even greater detail for every month. The character and the quantity of the diet, purging and bleeding, continence in love, the amount of movement, all are discussed. For the mid-summer months it is recommended that food and drink, especially the use of alcoholic beverages, should be greatly restricted; love is described as endangering life; and the reader is warned against bathing. The parts of the body which are to be bled are indicated precisely for the individual months. The duration of sleep should vary with the seasons, but it should not be less than six hours. In order that sleep should be beneficial, close attention must also be paid to the position in which one sleeps. One of the most important rules of health is not to sleep during the daytime. Whoever neglects this will get headaches, colds or fever, especially if he sleeps too long or after a meal. Anyone who feels that he must rest longer may do so during the months that end in "us", e.g. Januarius, Februarius, etc.

Especially important is the regulation of digestion. When evacuation is necessary, so says the *Regimen*, one ought not restrain oneself even if a king with his entire retinue should be passing! Likewise no attempt should be made to avoid letting wind for any reason whatsoever. The intestine should receive the necessary attention two to three times a day, the bladder six times.

No less important for health is bathing. Baths are a remedy for headache, fever, ulcers or fresh wounds, but one should not bathe with a full stomach nor should one write after bathing, unless one does not care to spare his eyes. To bathe too long is unhealthy because it increases the moisture of the body.

Nutrition

The best diet is not one that is varied, but rather a uniform one. Apples, pears, milk, cheese and rabbit meat are harmful, furthermore everything that is baked, but each for a different reason. Bread dipped in wine according to the ancient custom may be eaten at the first breakfast. Otherwise it should be consumed only in small quantities and never together with meat or wine. Butter is a good laxative. Cheese when consumed with milk produces rashes, but at the end of a meal it is nutritious. Vegetables are often advantageous. Leeks can stop bleeding and make women fertile. An onion dipped in honey and vinegar cures dogbites; when pounded into small pieces it makes hair grow. Nuts contain a strong poison. Wine should be drunk immediately after eating pears. Only cherries, grapes, plums and figs are good for health; they also act as laxatives. Water is to be banished completely from the table; wine is regarded as the preeminent beverage with meals.

Medicinal Remedies

Following the description of the qualities of foods, medicines are discussed in more than 800 verses. They are chiefly remedies of plant origin, and in most instances the purgative or diuretic action is emphasized. The medicinal action of each plant is described e.g. aloes is said to dry up wounds, to relieve headaches and eye, ear and tongue complaints, and to cure falling hair and jaundice. Cinnamon is recommended against palpitation of the heart; coriander (*Rumex acetosa*) is supposed to stop menstruation while caraway diminishes it. Fennel seed and cumin are harmful to pregnant women, but like the clove also excellent aphrodisiacs. White pepper soothes the nerves, relieves cough and gets rid of spots in front of the eyes.

It is generally assumed that the original version of the *Regimen* extended only to the end of the chapter on medicaments. The



A doctor prescribes baths for a patient. Miniature initial from a work of Constantinus Africanus. 14th century. Bibliothèque nationale, Paris.

subsequent portions were added later. It is indeed striking that no Arabic influences can be recognized in them.

Anatomy

In the complete edition of the *Collectio* only 35 verses are devoted to anatomy, while in most other editions, as, for instance, that issued by the French medical historian Daremberg in 1880, only 10 verses deal with it. If one considers that at that time the textbooks of anatomy themselves consisted of only a few pages, it is understandable that a popular work could deal with anatomy in a few lines.

The *Regimen* lists: nervus et arteria, cutis, os, caro, glandula, vena, pinguedo, cartilago et membrana, tenontes (nerves and arteries, skin, bones, flesh, glands, veins, fat, cartilage, tendons), and the number of bones (219), teeth (32) and veins (365) are stated. As "membra officialia" are listed the following: liver, stomach, head, spleen,

foot, hand and heart, uterus, gallbladder and urinary bladder.

Physiology

The physiology of the *Regimen* is influenced by the Hippocratic humoral theory. The body is composed of four humors: blood, phlegm (phlegma), yellow bile (cholera) and black bile (melancholia). Within the human organism they represent the universe, for they represent the four elemental qualities: hot, cold, dry, and moist, and are correlated with the four basic elements of which the world is constructed—blood with air, phlegm with water, yellow bile with fire, and black bile with earth. In nature one of the elements predominates during each season, air in spring, fire in summer, earth during the fall, and water in winter. Human life also corresponds to these changes. Here too there are four ages each of which is ruled by one of the humors, for instance, youth by blood. Furthermore, in each person one of the humors predominates quite independently of his age. On the nature of this humor depends his constitution, with everything that it determines, the physical and intellectual habitus, the inclinations of the individual and his diseases. Thus the sanguine person craves for pleasure, enjoys life, is good-natured and kind. He blushes easily and tends to obesity. A choleric person is passionate, irascible, authoritarian and ambitious, tall, thin, and of a yellowish complexion. A phlegmatic person is marked by his short stature, corpulence and pallor. He is always sleepy and shows no interest in anything. A melancholy person is sad, avoids people, constantly suspects danger, is happy at other people's misfortunes, and sleeps uneasily. He is haggard, dark and appears all dried up.

Life is connected with the heart, the mind with the brain. The humors are formed in the liver, the veins contain blood, the spleen black bile, which is evacuated through the rectum, the lungs phlegm which is excreted through the urine, and the bladder yellow

bile which leaves the body through the perspiration. The humors pass from one organ to another with the blood. That portion of the food which is not excreted as urine or feces is carried by the blood throughout the body which is nourished in this way.

Pathology and Therapy

An excess of a humor causes certain pathological states that become specific diseases and may end fatally. (There is never any talk of the decrease of a humor, probably because it is assumed that when there is a lack of one humor another is simultaneously present in excess.) A plethora of blood, for instance, can give rise to hemorrhages, red rashes, pustules, and dropsy. Too much bile produces tinnitus, vomiting, thirst, appetite, and insomnia. Too much phlegm is the cause of pain in the stomach and the flank, nausea, low body temperature, slow pulse, and pain in the back of the head. The pulse is also slow when there is an excess of black bile; there is ringing in the ears, a bad taste in the mouth and general weakness supervenes. In time this state may give rise to such diseases as cancer, elephantiasis, mania, leprosy, intermittent fever or hemorrhoids.

Among the most important disease symptoms are pains, tumors, ulcers, changes of complexion, and the particular constitution of the perspiration and the excretions. For instance, hot perspiration is a sign of chronic disease, cold sweat of a latent malady, while slight perspiration indicates that the morbid matter is being excreted in an abnormal manner. If the blood when it gushes forth during bleeding is foamy, it indicates cough, if it is bluish it is a sign of liver disease, etc. The appearance of the excrements, the odor of expectorated mucus, and above all of the urine, provide important information concerning disease, for each of these excretions contains the humor that has caused the disease. To be sure, in order to be able to make a correct diagnosis, one ought not to

rely only on these phenomena, but should also pay attention to the appearance of the patient. Only when one has obtained a picture of the mode of life, the habits, and the constitution of the patient can his disease be fathomed. Diseases can be hereditary, as leprosy or tuberculosis, or acquired like tonsillitis. They affect the entire body or only one of its parts. The disturbance of equilibrium which is the underlying cause of disease can be produced by five different causes: excessively hot blood, physical or mental overburdening, poor nutrition, vascular distention or contraction, and corrupted humors.

It is strange that the same disease often has different names depending on the part of the body in which it occurs. For instance, gout is called paralysis when the entire right side of the body is affected, podagra when the feet are affected, arthritis when the joints are attacked, sciatica when the legs are affected, and tetanus when the entire body suffers. The cold and all its accompanying symptoms and sequelae, such as pain in the frontal sinus, sore throat, cough, etc., are treated in detail. The consumption of hot foods and beverages and the application of hot packs to the head are recommended as therapy. Tuberculous patients are to be well fed, chiefly with milk, mixed with honey and salt, and they should have as much fresh air as possible. The sick room of a fever patient must be well aired and should be warm rather than cool. A sore throat requires an immediate blood-letting, pains in the ear are treated with eel fat, and eye complaints by biting on cumin and washing the eyes with rose water. The *Regimen* is aware that smallpox is spread by contagion, and can be avoided through care and caution. An even better method of escaping this frightful disease is to inoculate the endangered person with "Variolas salubres".

The Medical Art

Without discussing the individual diseases the therapeutic chapter of the *Regimen* deals

THE SALERNITAN PHYSICIAN

DR. A. G. CHEVALIER

JUST AS Hippocrates in one of his works dealt with the physician and his conduct toward the patient, so the masters of the School of Salerno did not feel that they had done their duty as teachers simply by imparting information to their students. They emphasized that it takes more than knowledge to make a perfect physician, and that the success of therapy also depends on the doctor, indeed, even on the first impression that he makes on the patient. For the Salernitans it was self-evident that this aspect of medical activity had to be thought through and put on a firm foundation, just as the Middle Ages sought to regulate in detail the activities of men in every field.

Thus it happens that one finds repeatedly in the Salernitan text books remarks on the

personality of the physician. The 12th century works of Archimathaenus *De instructione medici* as well as the contemporary anonymous *De adventu medici* contain alongside of purely medical problems discussions of how the doctor ought to speak to the patient and his family, and how he ought to act while visiting the patient.

Like the Hippocratic physician, the Salernitan doctor is pious; he knows the limits of the medical art only too well. As the doctor, despite the most thorough examination, does not always succeed in recognizing the disease, he should try to learn as much as possible about the patient and all the circumstances that may concern him from the messenger who has called him.

The doctor who follows the precepts of

Bleeding to reduce fever. From an Arabic book on fever translated by Constantinus Africanus into Latin.





Frederick II (1215-1250), King of the two Sicilies, on a contemporary South Italian coin.

amined the quantity, density and color of the urine as well as any deposits that were present, for quite apart from the fact that these observations could be very helpful for the diagnosis, it was also desirable to have the patient and those around him admire the conscientiousness of the physician. No matter what the result of the first examination was the doctor promised the patient that with the help of God he would soon recover. Under all circumstances, however, he solemnly informed the family that the case was a serious one. In this way the doctor increases his reputation if the cure is successful and decreases his responsibility if the outcome is fatal.

Therapy is undertaken even when the doctor regards it as superfluous. For, says Archimathaeus, if the patient notices that he recovers without the help of the doctor, he will reduce the fee. As the dietary takes first place the physician must take an interest in every detail of the patient's food. It is also an advantage if he knows a good many

recipes, and understands how to serve food to a sick person so as to stimulate his appetite. Upon leaving the patient the doctor should present a serious appearance; not until the patient is convalescing should the doctor be in good humor and appear happy.

"Exige dum dolore est", demand as long as the pain exists, says the *Regimen sanitatis*. If despite all precautionary measures, however, the physician does not receive his fee, Magister Salernus, one of the outstanding representatives of Salerno's most flourishing period, suggests giving the patient olum instead of salt for his food, or to make him sick in some other inconspicuous manner so that he will learn how much he depends on his doctor! If the Salernitan doctors, as Archimathaeus describes them, had to have recourse to such expedients despite a sincere endeavor to achieve a dignified standard of conduct and a high professional morality, it was due to the circumstance that the medical profession had no legal protection at that time. No law established what a doctor was to receive, and none gave him any specific obligations. No authority except the church watched over the doctor's professional life! Only the church insisted that the doctor give an accounting of his professional activity in the confessional. It also forbade them even in hopeless cases to use new or not absolutely approved remedies. This explains why Roland of Parma (*circa* 1240), a pupil of the great Salernitan surgeon Roger Frugardi (2nd half of the 12th



A doctor feeling a patient's pulse. From the *Liber pulsuum Philareti*, 13th century. Bibliothèque nationale, Paris.



A doctor feeling a sick king's pulse. In the text he is described as the "physician of soul and body". From a Greek therapeutic work of Alexander of Tralles. Greek manuscript *ca.* 1400. Bibliothèque nationale, Paris.

century) and an outstanding practitioner, once had to ask the archbishop's permission to perform a serious and unusual operation. Even if it were unsuccessful neither the law nor his professional colleagues would have been able to call him to account; only the church could do it.

As long as the School of Salerno was still small, the lack of any precise regulation of the medical profession had no unfortunate results. In the 13th century, however, when all other fields of social life were regulated in the most minute detail, the anarchy that prevailed in the Civitas Hippocratica, and which Gilles de Corbeil already reports at the beginning of the century, must have appeared particularly crass. Thus it is understandable that Emperor Frederick II (1215-1250), who encouraged the sciences and believed in strict organization, undertook to organize the medical profession. In his famous decree of 1240 more is demanded of

the students than to pass the examination which had been required by King Roger II (1130-1154). The candidate, who was examined by his teachers in a public assembly and declared fit for the medical profession, had to send his certificates together with a confirmation of his legitimate descent and his unblemished reputation to the Emperor himself or to his representative. From him he first received the final permission to practice. It was granted together with the diploma whereby he had to take an oath to treat the sick poor gratis and also to provide them with medicines. Furthermore he had to swear that he would constantly improve his professional knowledge and would faithfully fulfill his duties.

A very definite course of study had to be completed before one could take the final examination. "As medical science can be understood only if one has previously learned logic", says Frederick II, entirely under the

MIXTUM COMPOSITUM

INDIAN MIRACLES

FOR MANY CENTURIES a strict training of the will has been practised in India, in some cases leading to remarkable results. On the other hand, there are in India, as everywhere in the East, innumerable conjurers who practise their tricks in the bazaars, at fairs and places of pilgrimage. They are all the more skilful, as the profession descends from father to son in a caste.

It is frequently impossible for the inexperienced traveller to say whether he is witnessing conjuring tricks of consummate

skill, or performances based on suggestion and a trained will.

One of the most famous Indian "miracles" is that of being buried alive, which is occasionally shown in Europe by non-Indian artists. Equally famous is the practice of walking bare-foot on red-hot coals, without any signs of burning becoming apparent.

A certain Khudabahsh Kashmiri recently demonstrated this feat before a number of London scholars interested in psychic research. The report was published in January, 1936, without giving an adequate explanation, but confirming the fact that the performer's feet were in no way protected. The same feat was accomplished by a Florentine monk named Peter, who was surnamed Igneus.

The famous rope-trick on the other hand, about which so much has been written, has never been confirmed, and may be described as legendary. It is supposed to consist of the following: the "miracle-performer" throws a rope into the air, which immediately stiffens like a pole. A boy climbs up it, finally disappearing into thin air. The man then proceeds to climb after him with a sword in his hand, and the gory pieces of the apparently butchered boy fall at the feet of the horrified onlookers. Immediately after, the boy appears from a basket on the ground perfectly unscathed. No living person seems to have seen this illusion, for such it must be, if anything at all.

Many attempts have been made to find a demonstrator, but apparently without success. An illusion practised very frequently is the apparent stabbing of a boy in a basket, who then appears from somewhere else, quite unharmed. This trick looks gruesome enough, and practised before an Indian street crowd has a much stronger effect than in a European Variety show. The so-called "mango-miracle" is also very popular, which consists of a mango-tree growing up from the seed in an amazingly short time before

Indian Saddhu.



the eyes of the spectators. Opinions as to whether it is a conjuring-trick, or whether the experiment is based on the addition of a certain substance to the mango-seed, differ widely, as in the case with all the attempts to explain these "miracles". Still it is worthy of note that this phenomenon is never shown with anything but a mango-seed.

C.W.T.

FAMINES IN INDIA OF YESTERDAY AND TODAY

The severe famines which sweep over India from time to time are the direct result of vagaries in the climate. As the harvest is almost exclusively dependent on sufficient rain falling during the monsoon period, a dry year invariably produces a failure of the crops. It is reported that in 1335 a famine set in, which lasted for nine years, depopulating the country, and driving the people to cannibalism. At that time a pound of corn cost 22 grains of silver and even more. At that early period no records of loss of life were kept.

The first famine to take up the attention of the British government was in Bengal in 1770. From that year to 1921 no fewer than 25 periods of acute distress were counted, often affecting large areas, and causing enormous loss of life. During the famine which afflicted Madras in 1833, 200,000 out of a total of 300,000 inhabitants died in the Gantur district. Owing to the lack of transport facilities, and the primitive methods of agriculture it was impossible to render effective assistance except by feeding those who took refuge in the cities. During the famine in 1860 the Government was able to provide paid work for the afflicted, one of the first cases of social welfare work in India.

The death-rate in times of famine has always been exceedingly high. In 1837 it was given as 800,000 which was considered a too conservative estimate. In 1869 more than 1,200,000 people died, in 1877 deaths amounted to more than 5,000,000 in Madras. In 1897 the whole of northern



Indian Yogi after being buried for ten hours.

India was affected and deaths amounted to 69 per thousand of the population.

From that time onward energetic government control set in. This consisted not only in employing the people of the distressed areas—in 1897 over four million, that is, 10% of the population of these districts—but above all in improving irrigation. The extension of the railway led to an improvement in the corn trade, and prevented grave catastrophies.

In 1920-21 these precautions proved so effective that only 3% of the population were in need of assistance.

C.W.T.

PARCHMENT, AN INVENTION OF THE ANCIENTS

Nowadays the word parchment invokes visions of ancient documents and treaties or of bulky volumes, jealously guarded in museums, archives, and libraries, and containing ancient lore accessible only to the happy few. Indeed, the time is long past when the skins of animals were of prime importance as writing materials. According to Pliny, the idea of using specially prepared animal skins for this purpose originated at Pergamon in Asia Minor. When the Ptolemies, the kings of Egypt, learned that King Eumenes II (197-159 B.C.), wished to found a library which

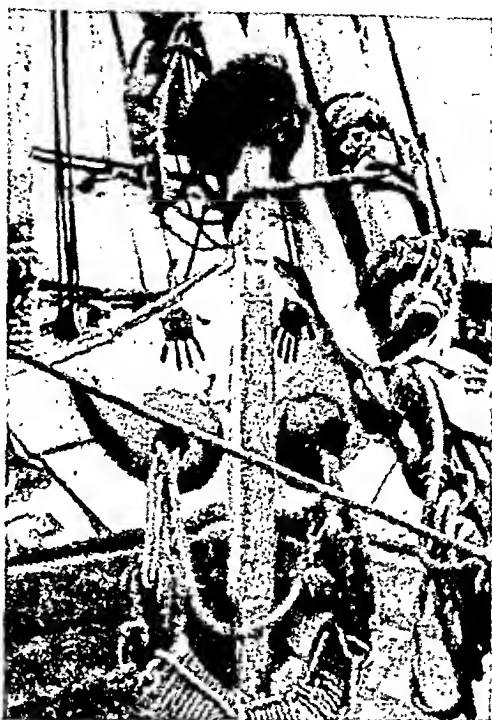
should rival that of Alexandria, they forbade the export of papyrus, the writing-material at that time customary. Thereupon it was decided at Pergamon to use animal skins instead of papyrus for their scrolls. The new material was called *pergamenum* (parchment) after the town where it was invented. There is no doubt, however, that animal skins were used as writing material long before the date given by Pliny. It was an ancient custom among the original inhabitants of Italy to inscribe agreements between two tribes on the skin of the animal sacrificed when the treaty was concluded. Gradually this custom lost the magic aspects originally governing it, and the durability of the skin as a writing material became the prime consideration. Damaged papyri were transcribed on to parchment, and under Constantine the Great (4th century A.D.) the demand for parchment exceeded that for papyrus. The dressing of parchment was done by the following process. The hair was removed from the skins of sheep, goats, donkeys, asses, calves, etc., which were then dressed with unslaked lime or dates, according to whether a stiff or soft material was desired. That was the practice of the Arabs, the methods adopted by the Ancients was probably very similar. In the West it was customary to rub the flesh-side of the skins with lime, and after leaving them lying for some days, to scrape the hair off. The skins were then soaked in limewater, dried, strewn with chalk or lime, and then polished with pumice stone.

G.A.F.

HANDS AS SYMBOLS

In the East where the language of signs has elaborate symbolic meaning, a movement of the hand may mean curse or blessing. Among the Aegean fishermen the open palm held out towards a person implies a hope that he may be stricken blind.

Closely linked with such symbolism is that of the handprint. The palms of the hands are often turned towards the particu-



Print of a hand on a Mohammedan sailing-vessel in the harbour of Port Said. Photo: G. Schaefer, Basle.

lar god which is being worshipped, and that explains the fact of Hindoos imprinting the mark of their hands on the dung of the sacred Zebu cattle. Mohammedans, whose gesture of prayer is the open hand, who swear by Allah with palm upraised, imprint the mark of their hand in the clay above the lintel of their door. This sign of adherence to Islam is also found on sailing ships. By affixing the mark of the hand, the fate of the boat is commended to the care of Allah, a fact made plainer still by the inscription: "rani bin yúd rabi"—"the ship is in God's hand". The colour of the print in the case of the boat photographed in Port Said harbour and reproduced here is blood-red; it leaves no doubt that these bold fishermen are descended from the dreaded pirates of the Mediterranean, whose handprints were intended to bring death and destruction to the infidel.

Sch.

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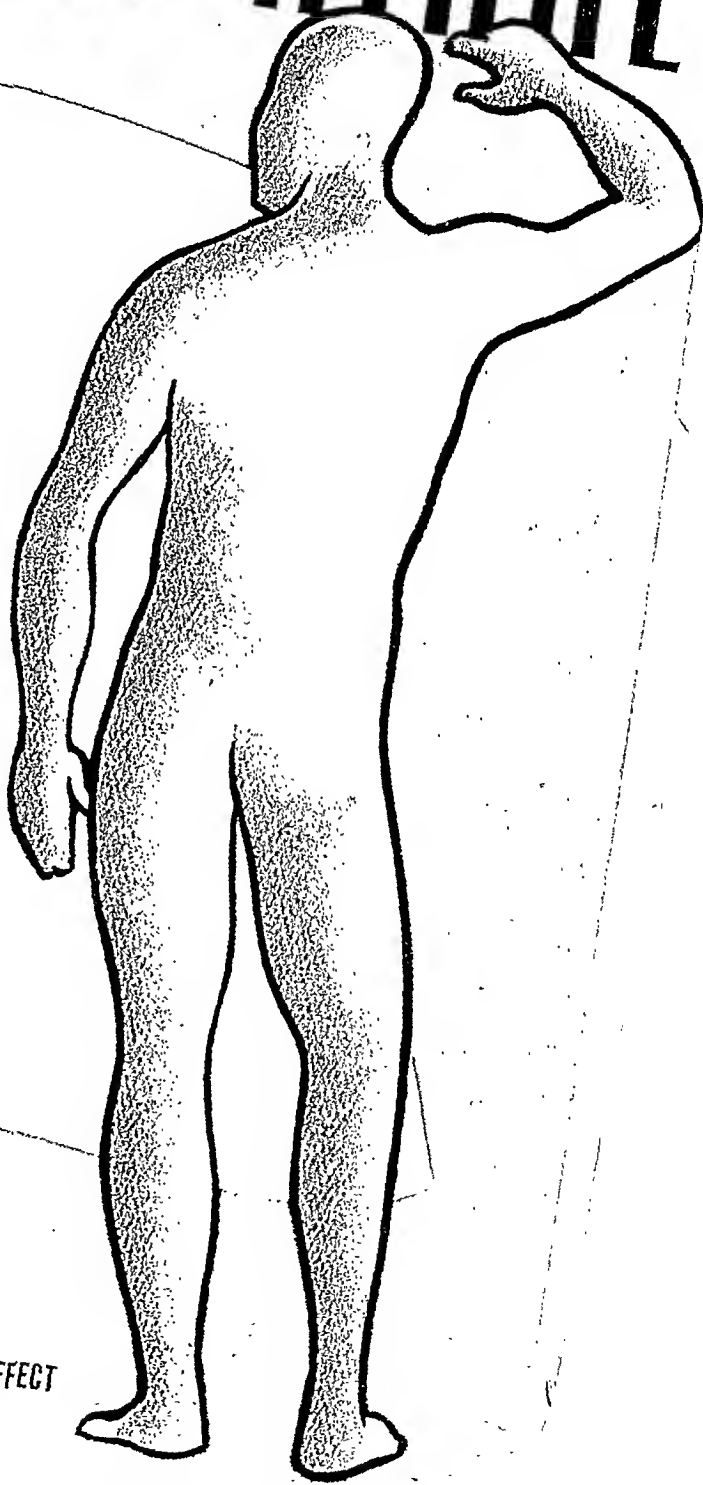
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